



CHEETAL

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TIGER ISSUE

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Hands off; my domain !

Photo: Bhagat Singh



CIRCULATION OF "CHEETAL"

This is an appeal to the members for launching a drive for wider membership of 'Cheetal'. Despite our best efforts to improve the quality of 'Cheetal' its circulation is dwindling. There are people who might not find joining the society attractive and would be interested only in a subscriber-membership. We request the members to be good enough to increase our circulation and help us to further improve 'Cheetal' by enrolling subscriber-members, like schools, colleges, institutions, societies, corporate bodies etc. The subscriber-membership fee is also Rs.100/- per annum for 4 issues of 'Cheetal'.

★★★★★

SOME of the annual and institutional members have not paid their subscriptions for the year(s) 1995-96 and 1996-97. Though the subscription for 1997-98 has also become due, they are requested to pay their subscriptions for 1995-96, 1996-97 and 1997-98 immediately. If their subscriptions are not received within a month, the Society will be compelled to stop sending 'Cheetal' to them.

The life members are requested to inform us of the change in their addresses or confirm the existing address. This information regarding confirmation of addresses is required by us for updating our membership rolls.

I.S.Negi
Hony. Secretary

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Editorial

Ever since the dawn of civilisation, India has been a devout country. Our ancestors worshipped the Mother Earth, the soil (*bhumi*), plants and animals. They held them in deep reverence as depicted in the following Sanskrit verses:

1. यस्यै वृक्षा वानस्पत्या, धुवास्तितष्ठान्ति विश्वहा ।
पृथिवीं विश्वधायसं, धृतामच्छावदामसि ॥

"O Mother Earth; you are the sustainer and preserver of all vegetation including medicinal plants as well as all living beings. May you the Devi Vasundhara nourish us as long as we live."

2. यत्ते भूमे बिखलामि क्षिप्रं तदापि ऐहतुः
याते मर्म बिमृग्वरी माते हृदयमीपपम् ।

"Whatever I take from the earth may that have quick growth again. O Purifier, may we not injure thy vitals or thy heart".

3. मूल ब्रह्मा, त्वचा विष्णु, शाखे रुद्र महेशवः ;
पत्रे पत्रे तुः देवस्नाम, वृक्षराज नमस्तुभ्यं ।

"Your root is Brahma, bark is Vishnu, branches are Shiva, all leaves represent gods and goddesses, O Tree, the king of plants, I vow to thee".

The Atharva veda is perhaps the first scripture where the concept of respect for Earth has been pronounced. In vedic era tree worship was quite popular. Further, Rigveda regarded plants as having divine power. Our ancestors considered it as their pious duty to save trees and in order to do so they accorded every tree religious sanctity. Similarly many wild animals have been revered in Hindu mythology and were associated with different gods and goddesses. This underlines not only a sense of respect for these plants and animals but also a reason for protecting them.

Whereas nature took 450 million years to nurse the earth into a flourishing play ground for life, man took barely a couple of hundred years to revage it. When our ancestors were so deeply devoted to nature and wildlife, why then their inheritors proved to be so callous to destroy them. It certainly calls for some soul searching. In India the concept of conservation dates back to vedic era and the westerners adopted it barely a century back. But paradoxically they have perfected this art and we are racing against time.

The policy and programmes enunciated by the Government have failed to motivate the people. The common man is as apathetic towards wildlife as ever. There is no coordination between the Government and N.G.Os. The media, both print and electronic, are not giving wildlife the quantum of coverage it deserves.

We often talk of our rich heritage and the need to preserve it for the posterity. The younger generation lacks the aptitude for conservation and are inclined towards consumerism. In order to catch them young, we organise on-the-spot painting competition, essay writing competition and exhibition on wildlife. But all this is momentary and does not make lasting impression on the heart and mind of the students. Last year the English medium schools of Dehradun asked the students of class IXth and XIth to prepare short projects on wildlife. A horde of students, who otherwise would never have bothered to know about wildlife, rushed to this Society's office for wildlife photographs and related material. Indeed, nothing works harder than the Head Master phobia.

It will, therefore, auger well if the subject of wildlife is included in the curriculum of our school and colleges and made compulsory at least upto Higher Secondary Classes. Only then will we be able to inculcate the spirit of wildlife preservation in our masses.

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TIGER TRAIL

By

I.S. Negi IFS (Retd.)*

“A Tiger is a large hearted gentleman with boundless courage and when he is exterminated- As exterminated he will be, unless public opinion rallies to his support-India will be the poorer by having lost the finest of her fauna” -Corbett

James Edward (Jim) Corbett, the doyen of wildlife conservationists, had predicted in early thirties about the doom of tiger by the turn of this century. Had we heeded to his warning this magnificent cat would have been saved to a large extent. But that was not to be. At the beginning of this century there were more than 40,000 tigers in India and to-day there are less than 4,000. To be precise the tiger population in 1930 was estimated to 40,000 and in 1939 the figure came down to 30,000. In 1969 it crashed to a low level of 3,000. In 1972, the census result showed that only 1827 tigers remained in India. What a disaster!

As a natural corollary, tiger population should have grown as did the human and cattle populations over the years. But whereas human population has registered a three fold growth in the past 50 years tiger population has declined to one twentieth. We seem to have killed 760 tigers annually between 1930 and 1980. And if we take the annual reproductive growth into account, which should be quite substantial, this figure may well nigh go up to 1,000 tigers annually. What a shame!

THE GENESIS:

Tiger (*Panthera tigris tigris*) is believed to have originated from islands around Caspian sea and travelled through Siberia, Manchuria, China, Thailand, Myanmar to India. In this marathon migration it inhabited many countries but nowhere did it settle and flourish so well as in India. It got acclimatised and adapted to varied geographical and climatic conditions of the sub-continent and made India its home. Except for the high Himalayas and desert region the Indian tiger, popularly known as the Royal Bengal Tiger, occupied whole of India, Nepal, Bhutan, Bangladesh and Myanmar. The tiger territory extended throughout India including

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mangrove swamps of Sunderbans, evergreen and deciduous forests, formidable heights of Himalayas tolerating an incredible variety of temperature and climate. It felt comfortable amid the mosquitos, flies and fleas of Sunderbans swamps, endured the heat of central India and has as well been seen at 13,000 feet above sea level in the Himalayas.

NATURAL HABITAT:

Though the tiger is found throughout India, except the western states of Rajasthan, Punjab and Haryana, but Uttar Pradesh can boast of harbouring maximum number of tigers. In the state of Uttar Pradesh the tiger is found in Shiwalik and Terai zone from river Yamuna in the west and Burhi Gandak in the east. The original and in some respect the most typical home of Indian tiger is the broken country of the Shiwaliks and the swampy *Terai* land fringing them to the south. The valleys between the Shiwaliks and the Himalayas are the ideal haunts for tiger. The tiger can be called a creature of sal which forms the gregarious stands interspersed with patches of grass resulting from annual fires that sweep through the forest in dry season, bringing regeneration and a new flush of green grass for grazing by tiger's prey animals viz; samber (*Cervus unicolor*), Spotted deer (*Axis axis*), swamp deer (*Cervus duvauceli*), Barking deer (*Muntiacus muntjak*), wild boar (*Sus scrofa*) etc. Broadleaved forests are the most suitable habitat of the tiger. The tiger requires three things in the vicinity where it stays. The presence of large number of prey animals, ample shade to sleep and enough water for drinking and bathing. Tiger loves swimming.

In spite of their size and weight they can move through reed thickets with extraordinary skill in avoiding detection when stalking and are thus able to catch animals such as hog deer and wild boar which frequently shelter in them.

THE SYMBIOSIS:

The tiger lives on other animals, mainly deer and wild pigs which in turn live on food and water. Food is derived from trees, bushes and grasses. The herbivores do not plunder the forest resources but in return help them regenerate by seed dispersal. The tiger keeps the population of deer and other prey animals under check and thus protect the forest from over grazing and consequent degradation. This indeed is a delicate balance of nature maintained by wild animals. The tiger plays important role in restricting the population of deer and wild boar which otherwise would multiply to such an extent as to endanger the agriculture and forestry, as is evident in areas where tiger has been exterminated.

LOCAL MIGRATION:

During summer when drinking water becomes scarce in *Terai* and *Bhabar* and forest fires make the environment unbearably sultry, the enthusiasts and enterprising among the royal predator make regular summer migration upto the hills from the fly infested forests and marshes. From Shiwaliks and *Terai* the tiger ascends to the Himalayas upto altitudes between 6,000 to 10,000 feet and at times to

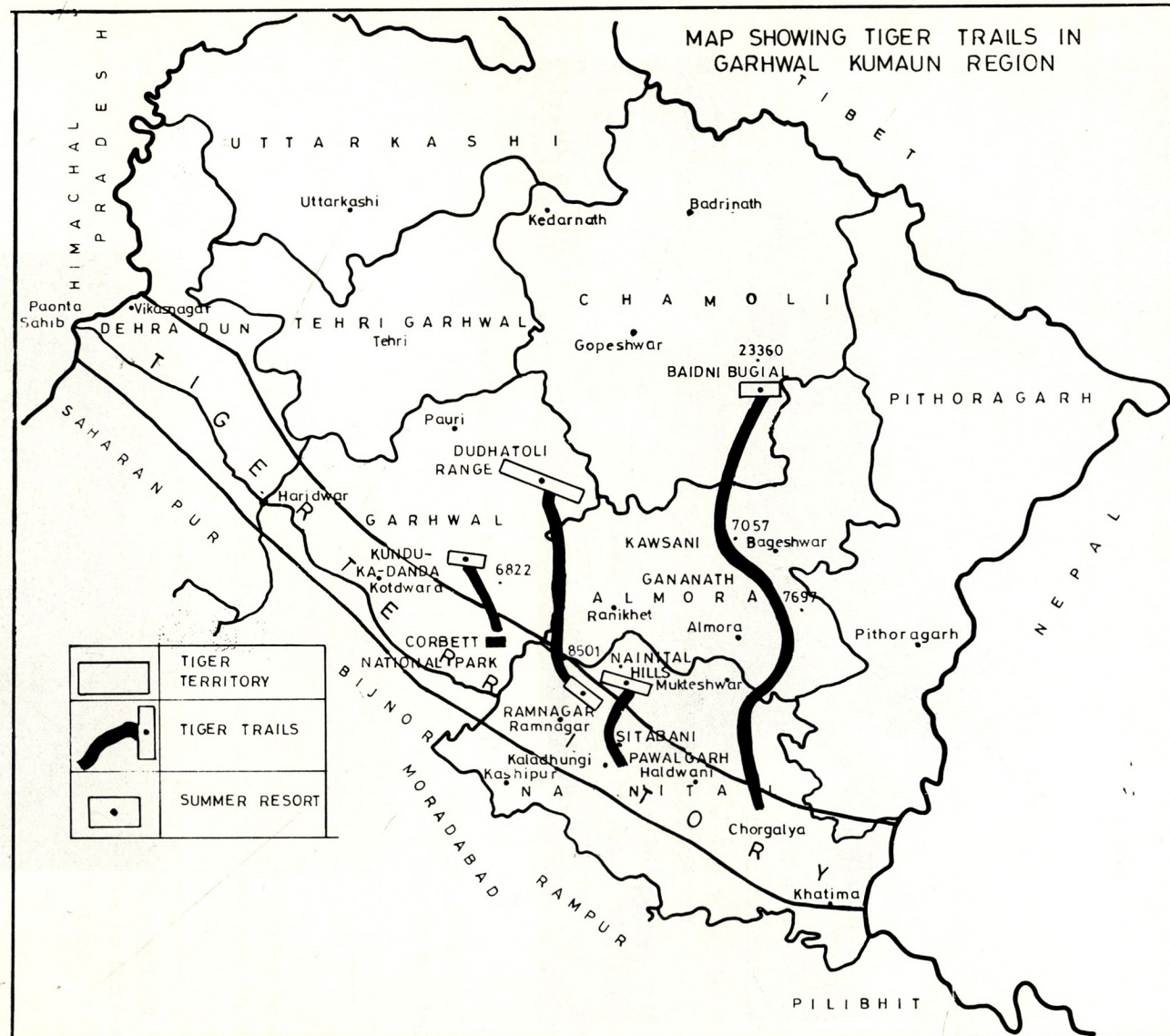


Tiger Loves Swimming Photo : Bhagat Singh



The area between forests and Himalayas comprises Alpine Pastures
Photo : I.S. Negi

MAP SHOWING TIGER TRAILS IN GARHWAL KUMAUN REGION



alpine pastures. And it does not take them much time, perhaps not more than a couple of days, in reaching their summer resort. One of the habits of the tiger is that when it is on the move, it is on the move till it reaches the destination. But neither there was a fixed destination nor a chartered route and the tiger made its northward journey through numerous contiguous belts of forests, which not only provided it with much needed cover and security but also prey while in transit. Some times the journeys were straight, while at others dog legged. Whatever be the case but it was obligatory or traditional for the tiger to pass through certain points. Old people in Garhwal and Kumaon bear the testimony that they had seen tiger passing through certain saddle or saw it lurking near a temple site. Tales of tiger visiting temples are legion both in Kumaon and Garhwal. Local people narrated how tiger used to pay its annual homage to various temples including that of Kedarnath (12,000 feet). Much of it may be exaggeration, mere gossip or even lies, but there is no gainsaying that tiger did visit the Himalayan forests regularly. This author saw a tiger shot by a District Education Officer in Baidni *bugial* (altitude-12,000 feet) in Garhwal Himalayas in June 1951. The altitudinal limits to its range in the Himalayas was mainly dictated by the availability of prey animals and adequate cover. But it was all in the proverbial good old days, when the hills of Uttar Pradesh were more or less covered with forests. Though the forests were pepper potted by cultivation but there was fair amount of contiguity so as to permit up and down movements of tiger. In recent times lack of adequate cover and food at higher altitudes has confined the tiger to the Shiwaliks and bordering areas.

THE TRAIL:

Though tiger occupied almost the entire belt of Shiwalik and Terai of Uttar Pradesh there were some forest blocks where it abounded, obviously due to abundance of prey animals in those areas. For example, the forest belt from Hardwar to Kotdwar, area around Dhikala (which now comprises Corbett National Park), Sitabani, Kaladhungi and Pawalgarh near Ramnagar and Chorgalia between Haldwani and Tanakpur had maximum concentration of tigers. Though the tiger felt comfortable in these places all the year round, yet in summer when water became scarce and these places became unbearably hot due to forest fires, some of the tigers did move up to higher hills to beat the summer heat. They used to migrate to higher hills of Nainital (7,000-8,000 feet), Dudhatoli (6,000-9,000 feet) and to alpine pastures, past the dizzy heights of Mukteshwar, Gananath, Kausani and Gwaldam. The country lying in between *Terai-Bhabar* and the higher hills was covered with dense forest which provided safe passage for the tiger.

The tiger had good reason to migrate in summer months to higher hills. There was adequate cover, ample food and water in the hills. In cold climate the requirement of water was cut down to half, even less, but the appetite doubled. But there was no dearth of prey animals. In Nainital hills sambar, barking deer and seraw were in abundance and the tiger was happy, so much so that despite heavy snowfall some of the tigers preferred to stay there only. In Dudhatoli in addition to preponderance of sambar, barking deer, wild boar etc; there were thousands of domestic buffaloes brought by villagers for summer grazing and steadling. It was not uncommon to see a tiger lurking near a *Kharak* (temporary steadling place) in Dudhatoli. Alpine pastures, as the name indicates, are excellent grazing grounds. They are famous for soft and succulent grass. In the past hill people of Garhwal took their sheep, goats, buffaloes and ponies to these alpine pastures for grazing in summer months. Tens of thousands of domestic animals grazed there day in and day out and it was but natural for the tiger to get lured and reach there, despite difficult terrain and inclement weather.

The tiger thus enjoyed the privilege of winter home and summer resort largely granted to it by nature. The forest belts served as corridors for the tiger linking its winter and summer habitat. Now the corridors have disappeared and with them disappeared the tiger trails and finally the tiger.

TURNING POINT:

Turn of first half of this century brought a spell of doom for the tiger. After forties there has been a steady decline in tiger population, when tiger suffered on two counts. One loss of habitat and the other indiscriminate killing.

A combination of factors have had an adverse effect on tiger population. They include habitat destruction, sport hunting and poaching initially for trophies but more recently for bones and other parts of animal, which fetch fabulous prices in international market. Middle men purchase tiger skin for Rs. 30,000 to 40,000 and sell abroad for Rs. 8 to 10 lakhs. China and Thailand are the main markets for tiger bones, blood and bile etc. Loss of habitat dealt a major blow to the existence of tiger. In Uttar Pradesh alone tens of thousands of hectares of forest land was disforested in Nainital Terai and allotted to freedom fighters and displaced persons for farming soon after Independence. Furthermore, thousands of hectares of sal forest was cleared for construction of Tumaria dam near Ramnagar, Nanaksagar dam near Khatima, Kalagarh dam right in the heart of Corbett National Park and Sharda and Gandak irrigation channels in eastern Uttar Pradesh. All these mega projects ate into tiger territory. Out of them Tumaria and Nanak Sagar dams have completely dried up and the fate of Kalagarh dam is also uncertain.

These schemes were ill conceived and met with the fate they deserved. But in this bizzare planning some of the finest stands of sal (*Shorea robusta*) forest have been lost forever. These developmental schemes, colonisation and human settlements in this area severed the contiguity of forest and led to its fragmentation disrupting migration of wild animals. The tiger which reigned supreme over the vast expanse of forest was denied both vertical and lateral migration and was left to the confines of a few small pockets.

The grassy *chaurs* and *chanders* within the sal forests, which were either a missing link in the process of succession or formed as a result of retrogression, were essential part of eco-system. They provided favourite grazing ground for deer, especially cheetal. These places were known for favourite haunts of tiger too.

But after Independence these *chaurs* and *chanders* were planted with fast growing species such as Eucalyptus, Semal, teak, khair, shisham etc; These species, though of great commercial utility, do not make fodder for the wildlife. Forced by the circumstances the herbivores came out on the agricultural fields bordering forest and got killed. The loss ultimately was that of tiger. It was not only subjected to the pressure of reduction in size of its habitat but also to a decline in the number of those species on which it preyed. Driven to the brink of starvation due to paucity of prey animals, the tiger sometimes was compelled to resort to cattle lifting and man eating and was shot dead having been declared so.

TIGER VERSUS GUN:

battle of gun after the Independence. Though shooting tigers with permit was in vogue before the Independence also, but there was better observance of rules and regulations then. But after Independence it was free for all and a sort of competition among the shikaries. Some shot the tigers for sport and trophies while others tested their marksmanship. The novice among the shikaries killed one tiger and injured two, leaving them to die in a shady nala. Considerable damage had already been done before shooting of tiger was banned in 1970. But worse than this, the tiger had to bear the onslaught of poaching for skin, bones and other parts even after the ban and tiger population crashed to all time low (1827 tigers in 1972). The valour, agility and fiery roaring of tiger could not match the fire power of gun. It seems there is no end to the miseries of the king of forest, the National Animal of India.

The wildlife protection act (1960) proved to be no more than a public relation exercise. People who were caught poaching in Corbett National Park, Hastinapur Sanctuary and recently in Rajaji National Park were let scot free and on the contrary wildlife staff who tried to book the offenders were unceremoniously shunted off.

PROJECT TIGER:

Alarmed with the hopelessly reduced number of tigers, the government of India launched Project Tiger in 1973 in nine protected areas, Corbett National Park being the first. To-day there are 23 tiger reserves with a total area of approximately 30000 sq.km. and harbouring 1366 tigers. The main object of launching Project Tiger was to ensure a viable population of tigers in India and development of tiger and its prey animals. Conservation of tiger cannot be seen in isolation. For the development of tiger habitat it is imperative to develop the food resource of the deer on whom the tiger subsists. Besides complete ban on tree felling and their removal from protected areas some sort of cultural operations and plantations of fodder species need to be done. If the forest is left to nature, in present day conditions, undersirable and unpalatable weeds like Lantana, Congress grass etc; invade the area and make an impregnable mass of vegetation that benefits none.

For the success of Project Tiger it is necessary to also develop the socio-economic conditions of the people living on the fringes of protected areas. These people are inseparable part of forest ecosystem. The villagers draw their sustenance from the protected areas and afford much needed protection to the wildlife. It is a stark reality that any forest oriented scheme launched without local people being taken into confidence is doomed to failure.

From the appraisal report prepared after the review of Project Tiger in 1993 it was revealed that tiger population in various tiger reserves was fluctuating and that the success the Project Tiger achieved in the initial years could not be maintained and even received a set back in some reserves. While poaching remains the major factor responsible for decline in tiger population, some other constraints also hamper the progress of Project Tiger. With the fragmentation of habitat the tiger has consequently been separated in small groups. No tiger population can survive and maintain itself indefinitely without gene diversity. For this it is necessary to have a contiguous population of at least 300 tigers besides a good habitat with adequate food, water and shelter. Tiger reserves are meant to meet these essential requirements. Research conducted at Sikhote-Alinisk Nature Reserve revealed that atleast 50 tigers are needed to prevent in-breeding and 500 tigers needed to ensure its long term survival. This will have to be taken into account while developing tiger habitat.

Four sub-species of tiger Bali, Javan, Chinese and Caspian are believed to have become extinct. Amur tiger also called Siberian tiger could be the next (250 to 500 remaining), given the low birth rate of Siberian tiger (2 to 3 cubs per year). A female Siberian tiger needs 80-160 sq.miles and male 230-300 sq.miles of land for free living. The Indian tiger requires five times more territory, although food is more plentiful in India than in Siberia. With fast depleting forests, where from will then so much land come, is a mute question. However, the conservationists world over optimistically feel that if any where the tiger can be saved from extinction, it is in India. Which is why the WWF-International is doling large amount of money for Project Tiger, whose success lies in the womb of future.

CAPTIVE BREEDING:

Breeding tiger in captivity is being considered in some quarters as the surest means of preserving its race. Sometimes back Chinese had suggested breeding tigers for slaughter. Every part of tiger's carcass is highly esteemed by the Chinese for its medicinal and aphrodisiac properties. There is a joke about Chinese that they will eat every thing four legged except table and chair. They are breeding 8 to 10 tigers per year for this purpose alone. Overcoming the initial hitch, some of the conservationists are not averse to Chinese suggestion. They argue that captive breeding for slaughter is definitely a lesser evil than losing tigers out of poaching. But this is altogether a different thinking to which not many people will subscribe. However, if the tigers are captive bred and translocated in the forest, it is not known whether they would be capable of hunting their own prey, a process which in the wild requires two years by their mothers.

Remarkable agility, powerful jaws, highly evolved brain and sensitive nose make the tiger super beast to reign the wild. These distinctive qualities and animal instinct cannot be acquired by captive bred tigers. Captive bred animals have a tendency to come near humans. These spoon-fed pets when released in the wild may not survive the ravages of poaching and other risk factors.

The Royal Bengal Tiger is sparkling king of jungle, a knight in shining coat. It is most magnificent of nature's animals. By captive breeding it will be reduced to the status of Siberian tiger, which despite being biggest and heaviest of all tigers could be captured alive by a couple of *lathi* wielding masqueraders with the help of a pair of dogs. It will be unfair to downgrade this brave and powerful feline and instead it should be allowed to flourish in its natural habitat. The money and resources that are being used in experimenting on the survival of tiger should be utilised in protecting, preserving and conserving the tiger in the forest.

WILDLIFE TOURISM :

India earns a whopping 30 million U.S. dollars annually in foreign exchange through wildlife related tourism. The foreign tourists come to India to see, along with other things, the tiger in jungle. "It is the wish of every visitor to see a wild tiger; even if he is moderately lucky and if he is not too pressed for time, there is every chance he will see one in a favoured reserve like Corbett or Kanha. But one thing is certain; none who has once seen it in all its wild majesty in the pristine jungles of its habitat is ever likely to forget the sight", writes B. Seshadri in his book-India's wildlife and wildlife reserves (1986).

Despite the awesome looks and fearful reputation, the tiger leaves man alone if he leaves it alone. G.P. Sanderson wrote in his book; Thirteen years among the wild beasts of India (1972) "that ordinary tigers are extraordinarily inoffensive".

CONCLUSION :

India has the proud privilege of having 65% of the surviving tigers of the world. Our responsibility to preserve the vanishing tiger is, therefore, greater than any other nation. Government organisations as well as a host of N.G.Os. are seized with the problem of rehabilitating the tiger to its habitat. Instead of working separately and more often than not at cross purposes, let us put our heads and resources together and try to redeem the lost paradise.

"Of the worlds surface, only eight to ten percent is at present used for food productions, Pioneer agriculturists and scientists have demonstrated the feasibility of growing food-yielding trees in most unlikely locations-rocky mountain sides and deserts with an annual rainfall of only two to four inches. With the aid of trees, at least three quarters of the earth could supply human needs, not only of food but of clothing, fuel, shelter and other basic products. At the same time wildlife could be conserved, pollution decreased, and the beauty of many landscapes enhanced with consequent moral, spiritual, and cultural benefits.

- Dr. Richard St. Berbe Baker.

Wildlife is a State subject and cannot be governed from Delhi. However,

CAN THE TIGER BE SAVED? - THE LAST CHANCE

By

Richard Waller

(Reproduced from 'Cheetal' of June, 1971)

Eight races of the tiger (*Panthera tigris*) are generally accepted according to the geographical distribution from Korea to Java and from the Caspian to Vietnam. One race must now be considered extinct, the Bali tiger (*P.t. balica*); six other races, on which we have uncertain information, were dealt with recently by Guy Mountfort ('Animals' July 1970)-each of these races is down to between 10 and 100 individuals at the most and declining.

The eighth is the type species, often called the Bengal tiger (*P.t.tigris*); it inhabits the Indian sub-continent and overlaps marginally into Burma. The saving of this race is only one hope for the species as a whole.

I have recently returned from six months in India and Nepal where I covered all the major wildlife sanctuaries; our estimate was 1,960 individuals remaining. This may sound a fair number, but when the area over which they range and the recent decline in number is studied, it can be realised how serious is the situation. I was first in India in 1939 and the estimate then was 30,000. 1,960 scattered over an area the size of Europe (ex.Russia) will indicate how few regions within this vast area can maintain a breeding population with sustained yields.

Our estimate (acknowledgement help of K.S. Sankhala) of the number of tiger remaining in the wild state in the Indian Union is set against the figure for 1969:-

1969	1970
2,815	1,872

The breakdown of these figures State by State is:-

	1969	1970
Andhra Pradesh	40	30
Assam	500	380
Bihar	90	70
Gujarat	5	2
Kerala	20	15
Madhya Pradesh	600	480
Maharashtra	329	180
Mysore	100	70
Nepal		
Manipur	100	60
Nagaland		
Orissa	326	150
Rajasthan	90	30
Tamil Nadu	15	15
Uttar Pradesh	500	350
West Bengal	110	40

On the Indian sub-continent, but outside the borders of the Indian Union, two small pockets exist where a few tiger are still found: parts of the Nepal terai with about 70 in all and the Sunderbans of East Pakistan with only about 20 remaining. The beautiful reserve of Sukla Phanta, situated in the western Nepal terai, is close to the Indian frontier. Mountfort ('Animals' July 1970) estimated 250 tiger in this reserve barely two year ago. They have now been literally decimated by poaching from both sides of the order. The Sunderbans tigers apparently did not suffer greatly from the recent cyclone which took such a devastating toll of human life; probably in part because the tiger swims well and also because the cyclone hit the land slightly east of the main tiger area. Even so their numbers are declining. Many tigers in this remote area of predominantly mangrove forests are man-eaters from lack of sufficient normal prey; this makes it easy for the poacher who can always claim that he shot in self defence and no one can prove to the contrary.

The main decline in numbers of tiger in India has taken place over the last thirty years—from about 30,000 in 1939 to under 2,000 in 1970. Before the Second World War the wildlife in the forests was, rightly or wrongly, looked open as the preserve of the rulers; the Princes and the British. Then in 1947 came independence for India and Pakistan and with it the feeling of the people "the forest and their animals now belong to us" so they went into the forests and killed everything they could see. Considerable slaughter of the tiger and his prey continued for nearly ten years; then the Indian Board for Wildlife was set up to confront the rapidly worsening situation and over fifty wildlife sanctuaries were created in India between 1950 and 1960. Many of these unfortunately are sanctuaries only in name; no protection is given and now they have little beyond birds, but it shows that the will to act was there already in the fifties.

The really dangerous decline in tiger numbers has taken place in the last five years since 1965. This sharp decline into danger of extinction is almost entirely due to the commercial value of tiger skins. All these skins come from illegal poaching, whether by the people living in or near the forests who poison the tiger's kill with toxic pesticides such as the colourless and odourless 'folidol' (I had evidence of Rs. 1,000 being offered to tribal people in Orissa for a tiger skin with head), or by the more affluent who come into the forest at night with rifle, spotlight and jeep.

"As the educated hunter is forbidden to shoot, the poacher moves in" has been said to me occasionally in India. There is a partial truth in this statement, but it is not a reason to allow tiger hunting to continue. There is nothing against the healthy sport of legitimate shooting provided the species is sufficiently numerous. If it is not, then every form of killing that species must be suspended, even by well regulated Shikar Companies. These Shikar Companies, largely operating in Madhya Pradesh and Uttar Pradesh and dependent on rich foreign clients, are not always scrupulous in observing the law. It is well known that some manage to "arrange" matters in such a way that their foreign client shoots two or even three tigers instead of the one allowed on his licence. These clients, mostly American with some Germans and South Americans, pay very large sums to bag a tiger. The normal charge is Rs.1,000 a day (£56 sterling) and they are usually required to pay for twenty days to ensure a tiger. Early in 1970 one American paid Rs.1 lakh (about £5,600 sterling) for one tiger. These prices give some idea of the difficulty of shooting a tiger and the desire of men to do so.

Wildlife is a State subject and cannot at present be governed from the Centre at Delhi. However,

every State where the tiger is found has now followed the strong recommendation of the Prime Minister and has banned the shooting of tiger for varying periods of three to five years, with the notable exception of Madhya Pradesh*. It is however hoped that means will be found of bringing pressure to bear and that very shortly the banning of tiger shooting will be complete throughout India. Nepal is banning tiger hunting with effect from March 1st, 1971.

It should be clearly understood that legitimate tiger hunting does not account for a large number. Poaching has been and still is the main danger to the continued existence of the tiger. What I describe as the underground pipeline from the jungle in India to the receiver in a western country-the woman with a tiger-skin coat and bag or the man with the head and skin on the wall of his house-must be cut. The Central Govt. banned the commercial export of skins in April 1969; previously tiger skins had been going out of the country in bales of thirty and forty at a time. This was the first step and an excellent one but hundreds of skins were still for sale to private individuals in shops and hotels in the main tourist towns of Delhi, Bombay and Calcutta. Last year in the New Market in Calcutta, I saw and priced fifty skins in five different shops within an hour; undoubtedly there were more in the godowns behind. The heads were all poorly set, showing underground taxidermy, and many skins were damaged. Even so, the average price was Rs. 3,500. These were being bought by foreigners who took them out as personal luggage and, if they wished to, sold them for three or four times the amount. Indian citizens were also doing this as it allowed them to finance their holiday abroad.

The Central Governments of India has now taken another important step and from September 1970 the export of tiger skins is totally banned, even as personal luggage. Smuggling will now be the only way to get a tiger skin out of India. This is difficult to control with a long coastline and with many ports full of foreign merchant seamen who can hide a few in the hold without difficulty.

The next step is without doubt up to the receiving countries. America and all the West European countries have now been asked by World Wild Life Fund to ban the import of skins and so assist towards drying up the demand. It appears that most governments are favourably disposed to do so, but rightly ask that the race of the tiger found in India should officially placed in the I.U.C.N. Red Book of Endangered Species, since this would help necessary passage of legislation. This is being done.

Another step which would help to cut the pipeline from the poacher in the jungle to woman's coat in the fur shop is the compliance of the International Fur Trade Federation. This Federation has advised its members in twenty three nations to impose a total ban to stop dealings in the skins of five endangered species: tiger, clouded leopard and snow leopard, and a temporary three year ban on cheetah and leopard. The Furriers Joint Council in the U.S.A. has agreed not to cut fashion or fabricate the skins of the large spotted cats. The legislation in India on the tiger also includes the three leopards.

A further piece of legislation in India is still necessary to make the final break in the pipeline and prevent the poacher from having a market to sell his skins. The State Trading Corporation should be legally empowered to buy up all existing stocks of tiger skins on sale in India. Thereafter any skin being offered for sale could be confiscated and the owner prosecuted. The skin of a man-eater or cattle-killer that had to be shot would automatically be bought by the State Trading Corporation.

I believe that all these measures are absolutely vital to the continued life of the tiger in India. We have got to realise that poaching is impossible to stop completely or even control sufficiently in the immediate future of the next two or three years to save the tiger from extinction. Therefore, the only hope is to bring about a situation in which the poacher no longer has any interest in killing the tiger. The measures I have given above, some still to be done, will bring about the desired situation.

I have entitled this article 'The Last Chance' because I believe that is exactly what it is. If the measures I have described are not fully put into practice then I consider the tiger doomed. No one can control the poacher at the present time. Let us be absolutely clear on this and not have any wishful thinking. The Indian Government are doing nearly all that is presently possible. The poorer poacher cannot be blamed; he is desperately poor. Forest guards cannot be blamed for looking the other way on receipt of a small sum; they are desperately underpaid. The real blame lies where the money lies—in the rich countries. The poor Indian peasant and even the forest guard really need the money to feed their children. The rich westerner cannot conceivably need a tiger skin.

* Editor's Note:- This state has now also banned the shooting of tiger.

“When the forests go, the waters go, the fish and game go, crops and flocks go, fertility departs. Then the the age-old phantoms appear stealthily one after another—Flood, Drought, Fire, Famine, Pestilence.”

—Robert Chambers

Tiger II - if the Tiger is Saved

In my article "Can the tiger be saved?- the last chance" I discussed the precarious status of the typical race or Bengal tiger (*Panthera tigris tigris*) and the chances of saving it from extinction in the next two or three years. I now want to consider some longer-term conservation policies which might be put into effect in India to better her wildlife management with special reference to the tiger, and increase foreign earnings from wildlife tourism.

India has 127 parks and sanctuaries listed. The vast majority of these have nothing in them at all except a few small mammals and birds. There tends to be a rivalry between the various State Governments in the Indian Union, to vie with each other in having so many wildlife sanctuaries. The wish to have them is commendable if they were protected, but there is little hope of money in the immediate future to protect them and in any case there is nothing left to protect. They are sanctuaries in name only.

The aim for the future must be a few large, very well protected National Parks staffed by a well-paid Wildlife Service. The largest at present in India is Periyar with 305 sq. miles, very small in comparison to E.Africa (e.g. Uganda's Elizabeth Park of 2,500 sq. miles) or to America (The Yellowstone Park of 3,500 sq. miles), but still large enough to form a viable eco-unit and to hold even the roaming tiger and elephant.

Protection is vital; there must be total exclusion of cultivation, grazing by domestic livestock and forestry operations. The staff must be well paid; they will deserve it as they will be well trained, since the higher echelons at least will have passed through the Wildlife Management Course at Dehra Dun and the Wildlife Guards will have passed through a State or regional course at the appropriate level (in the case of Periyar and the other S.Indian sanctuaries it could be a course at the Coimbatore Forest School). There can be no excuse about inability to give good pay. There will be very few parks or sanctuaries and the money will be concentrated on these few. A highly paid dedicated staff is far better than a large, dispersed, underpaid one. The Wildlife Guards will be well armed with the legal sanction to use these arms in well defined circumstances; they will be well-equipped with binoculars and two-way radio sets and with any other equipment that may be necessary to make a really effective deterrent against any possible poachers.

There is need to increase the natural prey of the tiger which, according to the area, consists mainly of sambar, chital, gaur and pig. In the open deciduous forest preferred by chital, there is no shortage; Schaller (1964) found that 52% of the tiger feces examined in Kanha, contained chital. In many areas there is no shortage of pig; in fact the predators are required to keep them down as they are prolific breeders and very destructive to nearby crops; this also applies to chital. Sambar however, show signs of decline everywhere; this is partly due to poaching but also to the depredations of wild dog and even jackal hunting in groups. Wild dog in particular should be treated as vermin in areas where they are too numerous; in Mysore last April I witnessed a hind sambar separated off, encircled by eight wild dog and then torn to pieces; in Rajasthan last June a similar unpleasant spectacle was perpetrated by jackal on a calving hind. In both cases they were seen through field glasses and I was too far off to effect a rescue in

time. All this is a question of wildlife management which will automatically result from well-trained, well-paid staff protecting a properly administered park.

Periyar is a good example for future development. It has no cultivation or forestry operations and virtually no grazing. With a permanent well-trained staff it could be a model for India into which tiger could then be successfully re-introduced, where gaur and pig are plentiful. Corbett, at the other end of India, is another example, with a reasonable area (203 sq. miles) which could be extended; it differs from Periyar in that it already has a good and fairly permanent staff but its conditions of forestry operations and grazing fall far short of the ideal. Chital, sambar and pig are plentiful here and it could, especially if extended, carry quite a few more tiger. Kaziranga, well staffed and managed, is essentially a reserve for rhino. It already has 20 to 30 tigers and it would not be advisable to introduce more into the types of habitat available there. Kanha has suitable habitat, but nothing can be done there until its administration and wildlife staff are properly organised.

When Mr. M.A. Badshah, still a very active conservationist, was the Chief Wildlife Officer of Tamil Nadu, he created a 'Tiger Sanctuary' in the forest-clad hills, 30 kms west of Tirunelveli. The necessary protection was not possible and the sanctuary is no longer affective, but the idea was a good one in a habitat suitable for tiger; it could be recreated when trained men are available to look after it. Such a sanctuary for breeding the tiger is infinitely preferable to releasing them from a zoo, where they have not learnt to kill naturally and will doubtfully survive in the wild.

The overall number of tigers is important but their distribution and density are the vital matters. They are now so few and so widely dispersed that in many areas there ceases to be a viable breeding population and hence no chance of sustained yield. For this a tiger sanctuary would be useful by concentrating a suitable number for the area available. A recent suggestion is a tiger breeding farm; something between an open zoo enclosure and a sanctuary. It could be about 100 acres of suitable habitat strongly fenced; large enough to allow for some natural killing to adapt the tigers into the wild.

India holds about 97% of all the tigers remaining in the sub-continent and, unless present conditions change radically in Pakistan and Nepal, where a few still hold out, India is the only hope for the continuance of the species. West Pakistan, since its foundation, has not possessed any tiger. East Pakistan may have a few wanderers in Sylhet and the Chittagong Hill Tracts from across the border. Her only resident population in the Sunderbans is dwindling rapidly and, in spite of a declared National Park, is probably now down to about 20. Of these a high proportion are man-eaters due, according to Tahawar Ali Khan who probably knows them better than any man alive, to being taught by their mothers this form of killing as well as to lack of suitable prey (a few chital and pig only). Man-eaters in the rest of the sub-continent are virtually non-existent at the present time. In five months I heard of none in any part. Hardly any tiger today survives the poachers weapons to live beyond five years of age; normally it is old age or wounds, or a combination of the two which cause man-eating (Sunderbans tigers excepted).

In Nepal, the situation is particularly tragic since it does not have to contend with the intricacies of democracy as India does, when seeking protection for its wildlife, and rigid protection could be brought within 24 hours if the order came from the right quarter. As it is, the Kanchenpur Sanctuary in the Terai

of West Nepal which includes the beautiful reserve of Sukla Phanta, up to recently famous for its tiger, now has only 10 to 15 at the most (J. Blower, U.N. Wildlife Adviser to Nepal. pers. comm., May 1970). There will still be a few scattered through the rest of the Nepalese Terai, certainly round the site of the commercial venture of 'Tiger Tops', and amounting in all to perhaps 60 to 70.

Recent news however from Nepal (Feb. 1971) is most encouraging and the King is taking a personal interest in the necessary protection for Sukla Phanta. Arrangements are being made for the removal of the villagers and their cattle to other suitable sites outside the sanctuary (J. Blower. pers. letter). Funds have also been allocated by the Nepalese Government for the demarcation of the other, formerly excellent, sanctuary of Chitawan which used to hold many rhino and some tiger, where in recent years the habitat of both species has been largely destroyed by unauthorised over-grazing by thousands of cattle. It is hoped that U.N., whose specialised agency F.A.O. now has a Wildlife Conservation Branch, will shortly assist the Nepalese Government with more funds and personnel for the effective development of these projects.

On the assumption that the decline in the numbers of tiger in India is being arrested, it is interesting to examine the chances for the average tourist of viewing one, since this is one of the main aims of the foreign tourist in the wildlife field and a failure to do so leaves a certain sense of disappointment.

The visitor has the best chance of seeing a tiger in the Kanha and Corbett National Parks. In Kanha the average density is one tiger to 3.5 sq. miles, in Corbett one to 4.5 and in Kaziranga one to 8.5 with all the others far behind. Not only is the density of numbers greater in Kanha but the forest, especially the Sal (*Shorea robusta*), is fairly open with little undergrowth, giving a better chance of viewing a tiger in daylight. However, it is around the Tourist Rest House at Dhikala, near the centre of the Corbett Park, that the foreign visitor probably has the best chance of seeing tiger during a short stay. In three days at Dhikala we distinguished five individuals (3 tigers, 2 tigresses) moving within three kilometres of the Tourist Rest House. Approximating this area at about 36 sq. km. or 15 sq. miles, gives an average of one tiger to 3 sq. miles, the highest concentration of tiger I came across in India. Kanha was the next with one to 3.5 but that was over the whole park and was not substantiated by me on either direct or indirect evidence. The interesting point about the high figures for this area in Corbett Park is that it centres on the Tourist Rest House, which is the basis for my suggestion that this park offers the tourist the best chance of viewing tiger. The Warden estimates that as many as 10 to 20 of the park's 40 to 50 tiger can usually be found within a radius of 8 kilometers (5 miles) of the Rest House at Dhikala. He told me that live bait are now tied up during the tourist season, but that beats for tiger by elephant are not normally held more than twice a week to avoid too much disturbance. Even so he reckons 25% of tourist to Corbett saw a tiger in the last two years, based on numbers of visitors in their books; but of course many stay only two or even one day. Assessing this another way, I would put the chances in Kanha at 10% (i.e. if a visitor stays ten days he would be very unlucky not to get one viewing,) while those in Corbett I put at 20% (i.e. if a visitor stays for five days he would be unlucky not to view once).

Other parks and sanctuaries where tourists may be lucky enough to see a tiger are Kaziranga in Assam, Sariska in Rajasthan and Palamau in Bihar. Mention should be made of the Chanda district of Maharashtra, where the average density may be one to 10 sq. miles; the adjoining district of Bastar in Madhya Pradesh may also have some pockets of density similar. A density higher than one to 3 is not

desirable as tigers need large ranges even though males do often tolerate each other. Assam remains the big question mark and there may well be some high densities and healthy breeding populations in the inaccessible forests of the far north and east. Tourists are not, at present, permitted in that area.

If the tiger is saved and its population is to increase, then continuous and vigilant protection is essential. Protection requires money and money comes from tourists. All tourists want, above all, to see tiger and most of them have no conception of how difficult this is at the present time. Some of them come on package tours which include the East Africa parks where lions are as prolific and in evidence as cats in the squares of Rome. Understandably they are disappointed in the animal viewing in India. No one has prepared them for this difference and the tourist brochures and agencies are partly to blame.

India can certainly learn about tourist facilities and techniques from East Africa, but beyond that it is pointless to compete. Rather she should accentuate their differences in her tourist brochures, stressing above all the thrill of elephant riding through the jungle which makes one a part of the habitat and identifies one with it in a way that no amount of driving in cars or landrovers across the savannahs can ever do. In East Africa the tourist sees the magnificent spectacle of hundreds of wildebeest, hartebeest, zebra and gazelle, as if on a television screen. He is purely a viewer quite separate from the spectacle. In the Indian jungle he is integrated into the life of the forest because he is riding on one of its own animals.

The problems of showing tiger to eager tourists will remain. They can click their cameras and blow their noses at the lions in Nairobi Park who merely look bored. A tiger is truer to the cat tribe and is suspicious and wary; the slightest rustle of a sandwich paper in a machan and the tiger will never pass that way again that night. Tourists should be forewarned of the totally different habits of the tiger and the lion; the one nocturnal and solitary in the forests, the other largely diurnal and sociable on the grasslands. They should be prepared for the rarity of tiger viewing; but when it comes, during an elephant beat or from a machan, what a fabulous thrill; no animal viewing in Africa can rival it. Not the normal tourist viewing at any rate, though my encounter with a mountain gorilla in the Congo quite equalled a tiger in India. The difference lies in the fact that a tourist in Africa does not expect to see a gorilla nor has he set hopes on it. A tourist in India has definitely set his sights on a tiger; to increase his enjoyment or lessen his disappointment he must be conditioned beforehand.

There is certainly no lack of talent in India for efficient advertising. Air India is a model of good and telling publicity about itself and India. Some of this talent could be borrowed to publicise, in an informative way, the wildlife parks and sanctuaries. Hopefully this will bring more foreign tourists and foreign exchange. The increased flow of tourist will present even greater problems for those responsible for showing them tiger. A comfortable and spacious observation tower overlooking a permanent waterhole where a live bait can be tied is probably the best answer. Only the very experienced expert can keep still all night or even for two or three hours; most tourists cannot be expected to do so beyond a certain point. They get hungry or thirsty and need a sandwich or drink; for this a small room with no windows behind and an open balcony is very useful. More elephants will be needed to be stationed in different parts of the park; tourists can then be driven by jeep to different points where tigers may be available and there mount their elephants. Too much beating of the same area is bound to cause disturbance; in Corbett no more than two beats a week are carried out in one area,

but more elephants widely dispersed would facilitate more beats and create more satisfied tourists. It will all need careful management. For instance it is not advisable to have too many live baits too frequently in the same area. Tigers get in one place, where baits are too frequent, they did not bother to kill but ate wretched animal alive; most tourist would not like this!

Just as there used to be Shikar agencies for hunting the tiger, so there should in the future be Photo Shikar agencies for photographing the tiger. I know of only one; they are doing an excellent job in taking out foreigners to photograph tiger and other animals. The Government of India should initially subsidise such agencies, or at least offer them interest loans until they are financially on their feet.

I have laid stress on tourist facilities since it is mainly through tourism that more money can be available to pay better salaries to wildlife personnel and protection for wildlife in India can be increased. Why should be Indians, in a country where twelve million extra people must be fed every year, conserve their wild animals just for foreigners to go and look at them? Equally responsible Indians, with power in the States or at the Centre should realise, as many are now doing, that wildlife sanctuaries cannot only pay for themselves, but earn valuable foreign exchange provided the tourist is offered reasonable facilities and a good organisation for viewing and photographing animals. It can be a vicious circle of poor facilities, badly protected sanctuaries with few animals, resulting in disillusioned tourists. Money must be injected somewhere and convert it into satisfied foreign tourists, spreading the word abroad in Europe and America, more tourists and money and hence better protected and organised sanctuaries with more animals to see. The future of the tiger depends as much on rational thinking along sound financial lines as it does on conservation and wildlife management plans.

In the meantime, while all these new projects of wildlife and tourism are going ahead in India, there is one man who is dedicating every moment of his working day to saving tiger. Mr. K.S. Sankhala, ex-Director of the Delhi Zoo, started his two year Nehru Research Fellowship in July 1970. He will be constantly touring the various Indian States which hold tiger and progressively assessing the situation area by area. So we should get a continuous picture of the status of the tiger throughout India during the course of his research work followed by a full census in mid 1972.

SUNDARBANS TIGER- AN ECOLOGICAL APPRAISAL

By

Kalyan Chakrabarti IFS*

Abstract

It is no gain-saying that man's basic life support system consists of land, water, air and the plant and animal resources in the biosphere. The crux of the whole problem is that while the biosphere is richly endowed with renewable and non-renewable resources, the human race has been multiplying at an alarmingly fast rate and consequently the demand for more and more resources multiplies. There is an old saying, probably from Thailand, according to which "Experience is a comb which Nature gives to man after he is bald". It is the boundless neglect of man towards his own support system that gives rise to the ecological imbalance and disaster in nature. Man has been continually altering his environment to cherish his short-sighted aspirations and thereby acts to his detriment. This has resulted in extermination of many plants and animals from the face of the earth. It sounds absurd to consider that India which had been for millennia the most favourite refuge for tiger, the magnificent cat now grimly struggles to save it from utter extinction. This is possibly the inscrutable course of natural history that has led the tiger to the brink of disaster.

Sundarbans- A Unique Ecosystem

As the activities of mankind impinge strongly on the animate and inanimate environment, in which they take place, and so is the interaction of environment on all kinds of human activities. Ecology is the fascinating study of the order in Nature which strives to maintain peace and harmony in her richly variegated, highly colourful but continually fretful household of Nature.

The tiger is at the apex of the large biological pyramid and, therefore, its preservation is possible only by maintaining its entire ecosystem in optimum conditions for supporting its viable population commensurate with maximum carrying capacity of the habitat. The tiger is popularly known as a symbol of magnanimity, colour, ferocity and awe. Nature's masterpiece of creation is the tiger.

Sundarbans is really a unique example of Nature's bounty. It is a tract where venomous snakes, sharp toothed sharks, lusty crocodiles, mysterious flamboyant tigers, delicate spotted deer and clumsy wild pigs have given an astonishing blending of fury and beauty. It is a curiously anomalous tract where mud-skipper fishes creep up the tree, tides in same creek run in the opposite directions, molluscs and crustacea are in abundance and high tides occur twice a day. Sundarbans has left the stamp of this peculiar environment upon all the plants and animals abounding therein. Each component life in Sundarbans is bewitching and its adaptation to this peculiar saline terrain has made each of them an absorbing object of study and research.

Behavioural Pattern of Tiger

Sundarbans tigers are erroneously branded as inherent and designed man-eaters. My study ranging over a period of about fifteen years since 1968 till to date in the mangrove swamps of Sundarbans has enabled me to classify Sundarbans tigers according to their behaviour pattern into three categories:-

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Catatory I: This includes two sub-catagories, first one being inherent and designed man-eater (25%) and the other sub-category includes the balance 75% non-man-eater. The first sub-category is again sub-divided into two microgroups, first one being aggressive man-eater (80%) and the second one being lusty and adventurous (balance 20%).

Category II: Undesigned man-eater (15%).

Category III: Circumstantial man-eater (60%)

Tigers falling into Category II and III obviously form the balance 75% of the first category.

Sundarbans supports such a fascinating habitat wherein the working biological system is tough, resilient, adaptive and surely designed for survival but on the other hand it is intricate, complex, interrelated and interacting. It holds the brightest promise as the suitable area to inhabit the magnificent cat and also to support a compact biota for the perpetual maintenance of an intergrated ecological fabric in nature.

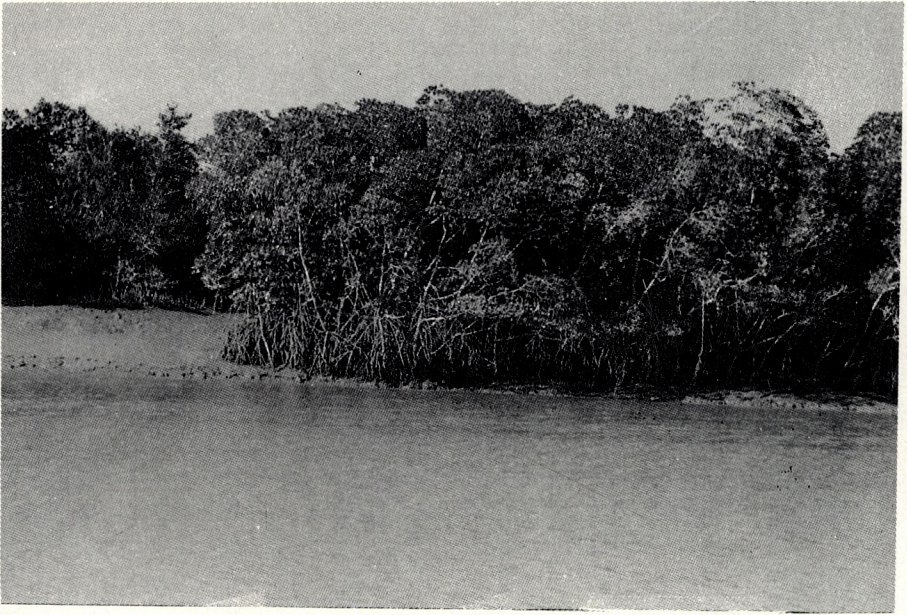
The swamps of Sundarbans are a land of diverse ecosystem. They are the biggest tracts of estuarine forests in the whole of the world covering about 10,000 square kilometres and one of the largest chunks of undisturbed forests and possibly form an ideal habitat for the tiger, though an inhospitable one where tidal action promotes a rapid circulation of nutrients and salinity varies widely both in vertical and horizontal planes.

The vast expanse of swamps studded closely with a net work of tiny islands of mudflats supports a low wooded forest of high density and virgin beauty. The rivers around tiny mudflats form fantastic labyrinths, bifurcations where hard and pointed pneumatophores give a trying time to the lives of Sunderbans. Opposite, unidirectional and oscillating tidal currents meet and exert considerable and complicated force for entire biota. Diurnal changes of salinity in water creates conditions to make physiological adjustments of the animal and plant communities very difficult. Sundarbans tiger project area is a negative estuary where the influx of fresh water is practically negligible. Tigers in general indicate euryhaline character as in many estuarine organisms.

Ecology of Sundarbans tiger and the behaviour pattern of the magical animal, the tiger had been studied by the author in great details. Some ecological relationships had been observed which clearly demonstrated the bio-ecological trains of Sundarbans tiger, which are simply astounding.

Human casualty is reported from all over the 15 blocks (65 compartments) covering 2585 sq.km. of Sundarbans tiger project area. This observation records the presence of aggressive man-eaters all over the project area indicating also a high population of tigers.

Migration of tiger from block to block and across international boundary is a feature, as the animal has been sighted negotiating vast expanse of water. This may be for finding out elevated lands above inundation level and also in search of prey animals, especially human beings. On many occasions, such tigers exhibited immense tenacity to fight various types of odd situations and saved themselves in the face of inevitable destruction.



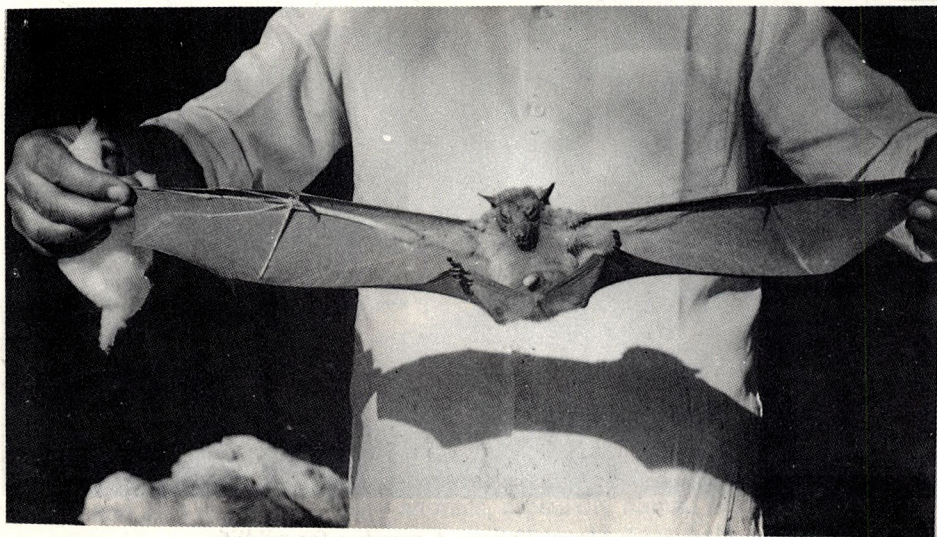
Sundarbans Mangrove-Swamps



Lush green Manas Valley : A paradise for wildlife
(see article on page 23)
Photo : E.P. Gee



Black Buck (*Antelope cervicapra*) has no parallel in galloping
(see article on page 39)



Rousettus leschenaulti (Desmarest)
(see article on page 55)

Average annual human casualty had been reported to be 36, but unofficial reports record about 100 (the forest being contiguous to Bangladesh forests). Dead bodies could only be recovered from the man-eaters in about 28.5% cases. The balance 71.5% were lost to the man-eaters.

Human casualty fluctuates from the lowest figures recorded during the rains to the highest during April and May. During these two month entire estuarine forests are flung into ceaseless activities owing to millions and millions of trees throwing new fush of leaves and flowers which attract myriads of swarms of *Apis dorsata* and honey combs are made all over the project areas. This coincides with the activities of all types of lives from Molluses and Crustaceae to *Homo sapiens*. Cunning tiger seize this opportunity to kill large number of honey collectors besides fisherman, shell collectors, timber coupe workers, etc. in this season.

The man-eaters have a diabolical understanding of human nature as they kill men between 7 A.M. to 8 A.M. (morning), 3 P.M. to 5 P.M. (afternoon) when the workers are just out to their work site and prepare to return to their camps in the evening (80% human casualty). Most notorious and cunning man-eaters are those that swim to the boat and mount on it, choose their victim and jump into water with the dead body and back to the forests. This occurs at 11 P.M. mostly when the boatmen are fast asleep.

Middle aged men (between 35 to 45) are usual choice in their prey; they find them, perhaps, more daring and indifferent towards self protection. Such cases form about 80% of human casualty figures.

Salinity of water is probably the most important factor responsible for a good percentage (25%) of tigers turning into man-eaters. Salinity and salt tolerance capability of tigers- their osmo-regulatory mechanism, if any, adaptation to constant fluctuation of salinity level, effect of salt water on kidney, liver and entire physiological system are thought to be the factors responsible for aggressive behaviour in tigers.

Pigs and deer are primary prey animals and they are in abundance. The terrain, however, is a serious handicap for the tigers to prey on such animals; compelled by circumstances, therefore, they take at monkeys, fish, birds, crabs and even honey.

Endogenous periodism is manifested by several estuarine organisms. The presence of a 'Biological Clock' on such organism has been suggested. The pattern of man-eating as manifested in fixed time of killing, maximum death at a block followed by a decline and then a rise succeeded by another at regular sequence, maximum casualty just before full moon and new moon clearly indicate some form of "Endogenous periodism" in the estuarine tigers (Mechanism called Endogenous self sustaining oscillation-or in short E-S-S-O).

Sundarbans forests need be conserved not for tiger alone but for acting as a natural barrier against severe cyclonic storm during the monsoon months. However, acute might be the immediate public need, these estuarine mangrove swamps have to be preserved to fight the mighty tidal wave of Bay of Bengal and to protect the lives and properties of millions of poor villagers residing adjacent to the forests. Projects tiger is essentially a nature conservation project.

The problems involving socio-economic scientific and administrative aspects of man in relation to Sundarbans tiger are specific and unique and attempts to solve them will require considerable time and intensive attention. The local people of the Sundarbans have a firm conviction that death is an inevitable phenomenon and occurs as decreed by the Tiger-God and there is nothing one can do about it; they have reconciled themselves to a co-existence with man-eaters; as such a supernatural creature cannot be exterminated. The tiger is accepted as a hard reality in the life style of Sundarbans men and people are only made to observe elaborate rituals of ground rules to ensure co-existence with the man-eaters. People of all religions, irrespective of their social position, caste and creed, sit together and pray for survival against this magical animal. This is the philosophy of man's relationship with the Sundarbans tigers. Sundarbans accepts both man and man-eaters in her ecosystem. Tiger is a living entity for man of Sundarbans-almost a part of their life system.

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HUMANIZED TIGER RESERVES; THE SIEGE WITHIN ?

By

Rakesh Shukla*

Of late there has been a serious debate, among the activists who have carved their niche out of the wildlife, sociological and economic fields to make it a distinct discipline dealing with the park-people affairs, on the possibility, or rather, urgency of recreating humanized wildlife reserves where people along with their livestock and agricultural fields can co-exist with wildlife and its habitats. All those in favour of humanized wildlife ecosystems are of the opinion that wildlife conservation in our country is based on the flawed western models where forests are accepted as wilderness areas, whereas in India these inhabit millions of people as dependents and all strategies of wildlife conservation which in any way disturb their lifestyle are bound to play havoc with them, and will ultimately meet with failure.

The above concept, which automatically puts the clock at least several decades back has, in short, no reason to believe in the relocation of villagers out of a nature reserve, and/or strict enforcement of any law prohibiting villagers and their livestock to make the most of this symbiosis. Such Arcadian philosophy is, sadly, nothing but just another fanciful approach to the realization of the Indian version of the ever elusive Utopia.

There is no denying the fact that people's participation with their fair share in management will definitely go a long way in the effective management, cooperation, not conflict with the managers and will ensure the longer sustainability of wildlife reserves in the country. And this has already been recognised by the government in the forms of ecodevelopment and joint forest management in the peripheral villages of select wildlife reserves. This participatory experiment is also said to have evoked a near euphoric response from the target people.

However, this is not possible to let the whole concept penetrate the core areas of the established nature reserves. Though even a die-hard pessimistic conservationist has to believe the attractive catchwords of the above philosophy, it must be translated into easily palpable and solid results before risking its extension into our hard managed wildlife reserves.

Easier said than done, there is such an intricate interplay of various demographic, ecological and economic limiting factors in the ever increasing biotic pressures, that it will be a Herculean task to control them in a humanized ecosystem and the huge ecological losses incurred at the very initial stages of the experimentation itself will be precariously irreversible. This has to be agreed upon at the outset that the population explosion and the rapid shrinkage of the forested land are the main causes of the present plight of the wildlife ecosystems throughout the country. As there are no easier solutions at hand to confront the rootcause with, the above concept is a mere desperate bid to accomodate a new Australia, being created each year, by further squeezing our wildlife habitats. There must be a realistic approach, and not an emotional or a phillanthropic one to seriously consider such a possibility vis-a-vis the fast growing consumerism among the rural people, and the government's own efforts for their

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socio-economic upliftment in every sphere of life. Therefore, this will only prove to be working at cross-purposes. When we accept the fact that progression, and not regression, is an evolutionary and materialistic reality in every social community, it is bound to clash with lives and habitats of wild animals more seriously and decisively in a humanized ecosystem than otherwise. The oft-repeated catchword "coexistence" when observed in its "true" sense held good till a few decades back and later it gave in to the mindless sportsmanship, and the materialistic and expansionistic attitudes of the people, bringing the wildlife to the verge of extinction. Therefore, the setting aside of a very small percentage

of the total forest area as nature reserves is still the best and most effective arrangement to ensure the management of whatever yet remains of our wildlife which has always been a miserable loser proving this "coexistence" to be a most inexpedient option in the present scenario. And, as there is absolutely no control over any of the human dimensions competing with the wild animal populations, such fantastical alternatives will never cease to stimulate our imagination and will bid the precious wildlife adieu forever, sooner rather than later. Furthermore, we must not forget that in spite of such a large area of forested land in the country, the scientific information on the status of wildlife suggests that these are only the protected areas which still sustains, apart from some highly endangered animal species, the viable wild animal populations of any consequence.

However, we must ensure that our "relocated" brethren are well provided for in all possible respects in their so called new hostile environment and they do not consider themselves as "displaced" or "dumped". This can only be achieved with some foresight and a well phased-out planning. Secondly, the concepts such as ecodevelopment and joint forest management, considered to be the last resorts for the effective protection of our nature reserves, have a very important role to play in reducing significantly the dependence of the surrounding inhabitants on the forest and convincing them of, and providing them with, the means for alternative and eco-friendly ways of living, which is the need of the hour.

As the park-people conflicts depend solely upon the factors discussed above, we should not be too optimistic about it unless either the threats posed to the wildlife population are completely wiped out, which is rather out of the question, or we are prepared to resign ourselves to compromising the fragile wildlife and its habitats and leaving them to fend for themselves. The home-truth remains, that under the circumstances each has to sustain at the cost of the other, and a line must be drawn somewhere to at least carefully maintain this "imbalance".

CHANGE IN VEGETATION COVER OF THE MANAS TIGER RESERVE IN BETWEEN 1989-93

By

S.K. Singh, Dhara Singh*

Introduction

The Manas Tiger Reserve covering an area of 470 sq. km. was established in 1973-74 in the Assam State. It is bounded in the north by international boundary between India and Bhutan and in the south by the thickly populated regions of the North Kamrup district of Assam. The terrain is flat and gently sloping to the south with a number of rivers flowing from north to south. The main rivers are Manas, Mora Manas, Jangrong, Gyati, Chorpuli, Garuchara and Rabang. The maximum temperature goes upto about 37°C and the minimum temperature is about 11°C.

It has the distinction of harbouring three types of vegetation which can be classified as

Tropical semi-evergreen forests:- These forests occur mostly along the northern parts of the Tiger Reserve on the India-Bhutan border. The common tree species found are- *Aphanamixis polystachaya*, *Anthocephalus chinensis*, *Syzygium cumini*, *S. formosum*, *S. oblatum*, *Bauhinia purpurea*, *Mallotus philipinensis*, *Cinnamomum tamala* and the undergrowth comprises mainly *Leea aquata*, *Coffea bengalensis*, *Phlogacanthus thyrsoiflorus*, *Adhoda vasica*, *Clerodendron viscosum*, *Holmskioldia sanguinea* and *peper diffusum*.

Tropical dry deciduous forests:- This is the major vegetation type in the Tiger Reserve. The common tree species found are *Bombax ceiba*, *Sterculia villosa*, *Dillenia indica*, *D. pentagyna*, *Careya arborea*, *Lagerstroemia parviflora*, *L. speciosa*, *Terminalia bellerica*, *T. Chebula*, *Trewia nudiflora*, *Gmelina arborea*, *Oroxylum indicum*, *Bridelia retusa*, etc.

Alluvial grasslands:- Extensive patches of grassland are found in the western part of Tiger Reserve. The common grass species are- *Apluda mutica*, *Chrysopogon aciculatus*, *Cynodon dactylon*, *Themeda villosa* and *Saccharum procerum*, etc.

Methodology

To detect the changes in the vegetation cover of the Manas Tiger Reserve between the period 1989-93 a study based on visual interpretation of the landsat imagery of 1:250,000 scale pertaining to the period 1989 and 1993 were used. The visually interpreted details were then transferred to the base maps prepared from Survey of India Topo sheets. The boundary of Tiger Reserve were obtained from the State Forest Department and then superimposed on the interpreted maps. The computation of area for both the periods in different categories was done using dot grid templet.

Result and Discussion

The following broad vegetal cover types were identified and delineated by the visual interpretation of the imagery :-

- | | | |
|------------------|-----|---|
| 1. Dense forests | ... | Crown density more than 40% |
| 2. Open forest | ... | Crown density between 10-40% |
| 3. Scrub | ... | Tree lands with less than 10% crown density but scrub more than 50% on the ground. |
| 4. Non-forest | ... | Non-forest areas which included agriculture land, forest blanks/grass land/water bodies |

The interpretation of the data revealed the following estimates of the forest cover in various categories :-

TABLE NO. 1

Table showing catagorywise distribution of forest cover (in sq. km.)

Category	Year of imagery		Net difference in the area as compared to 1989	% change
	1989	1993		
Dense forest	170.16	164.76	5.40 (-)	3.17
Open forest	45.76	45.07	0.69 (-)	1.51
Non-forest (including water bodies)	254.08	260.17	6.09 (+)	2.40
TOTAL :-	470.00	470.00	—	—

The above results indicate:

- The dense forests cover has decreased by 5.04 km.² which means there has been degradation in the dense forests.
- The open forests cover has decreased by 0.69 km.²
- The non-forests area has increased by 6.09 Km.²
- The changes that have occurred in different categories of forest cover between 1989 and 1993 is given in Table No. 2.

TABLE NO.2

Sl.No.		Area in Sq.Km.
1.	Dense forest to open forest	0.86
2.	Dense forest to open forest	5.63
3.	Open forest to dense forest	1.09
4.	Open forest to non-forest	2.99
5.	Non-forest to open forest	2.53

Conclusion

- The above analysis reveals that 8.62 km.² of dense/open forests have become non-forest.
- 86 sq. km. of earlier dense forest have changed into open forests with crown density less than 40%.
- 1.09 sq. km. which was earlier open forest with density less than 40% has improved in crown density to be classed as dense forest.
- 2.53 sq. km. which was a earlier non-forest has improved in crown density to be classed as open forest.

Acknowledgement

Authors thank Dr.S.N. Rai, Director of FSI for his encouragement to take up this study.

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2. State of Forest Report- 1993-Forest Survey of India.

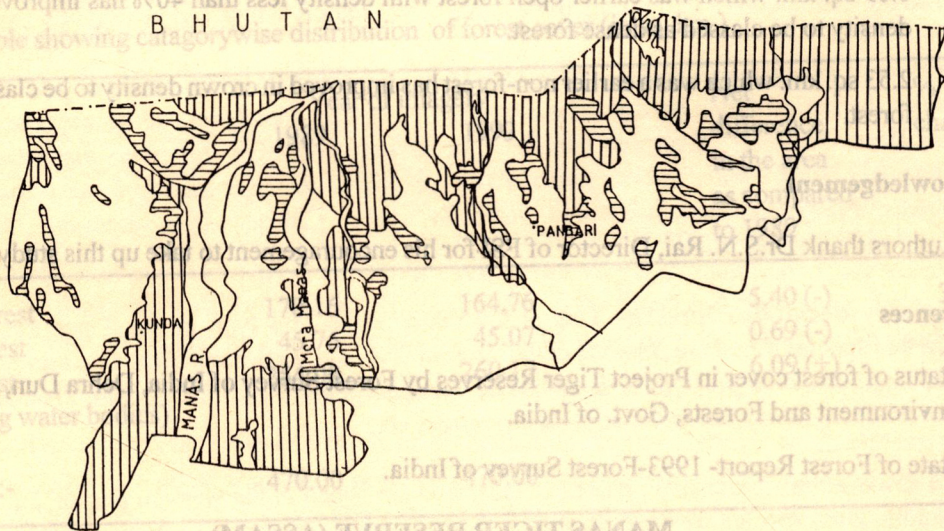
MANAS TIGER RESERVE (ASSAM)

Confusion Matrix for change in forest cover

Year 1989

	Dense forest	Open forest	Mangrove	Coffee	Scrub	Non-forest	Uninterpreted	Total
Dense forest	163.67	1.09	-	-	-	-	-	164.76
Open forest	0.86	41.68	-	-	-	2.53	-	45.07
Mangrove	-	-	-	-	-	-	-	-
Coffee	-	-	-	-	-	-	-	-
Scrub	-	-	-	-	-	-	-	-
Non-forest	5.63	2.99	-	-	-	251.55	-	260.17
Uninterpreted	-	-	-	-	-	-	-	-
Total	170.16	45.76	-	-	-	254.08	-	470.00

VEGETATION MAP OF
MANAS TIGER RESERVE, GOALPARA & KAMRUP, ASSAM
(BASED ON VISUAL INTERPRETATION OF LANDSAT IMAGERY 1987-89)
SCALE 1:250,000



DETAIL

Symbol

Area in km.²

1. DENSE FOREST-Crown Density above 40%
2. OPEN FOREST-Crown Density 10 to 40%
3. NON-FOREST INCLUDING WATER BODIES

TOTAL AREA



170.16
45.76
254.08
470.00

VEGETATION MAP OF
MANAS TIGER RESERVE, GOALPARA & KAMRUP, ASSAM
(CHANGE OF VEGETAL COVER DURING THE PERIOD 1989 - 1993)
SCALE 1:250,000

Principles of Interpretation:

As described by Freeman Tilden (1883-1980):

I. Any interpretation that does not somewhat relate what is being displayed or described to something within the personality - of the experience of visitor will be sterile.

II. An art, whether the material is historic or scientific, is teachable.

III. Interpretation should be addressed to the whole process, not just to the end result.

IV. Interpretation should be addressed to the whole process, not just to the end result.

Goals of Interpretation:

I. In relation to the visitor:

- Foster appreciation of the natural and cultural resources.
- Develop understanding for the management of the resources.

II. In relation to the agency:

- Enhance image of agency.
- Encourage public participation in management.

III. In relation to the visitor:

DIFFERENCE		CHANGE in km ²	
1. DENSE FOREST	5.40 (-)	DENSE - OPEN (1-2)	0.86
2. OPEN FOREST	0.69 (-)	DENSE-NONFOREST (1-9)	5.63
3. NON-FOREST	6.09 (+)	OPEN-DENSE (2-1)	1.09
		OPEN-NONFOREST (2-9)	2.99
		NONFOREST-OPEN (9-2)	2.53

Interpretation as viewed through the following:

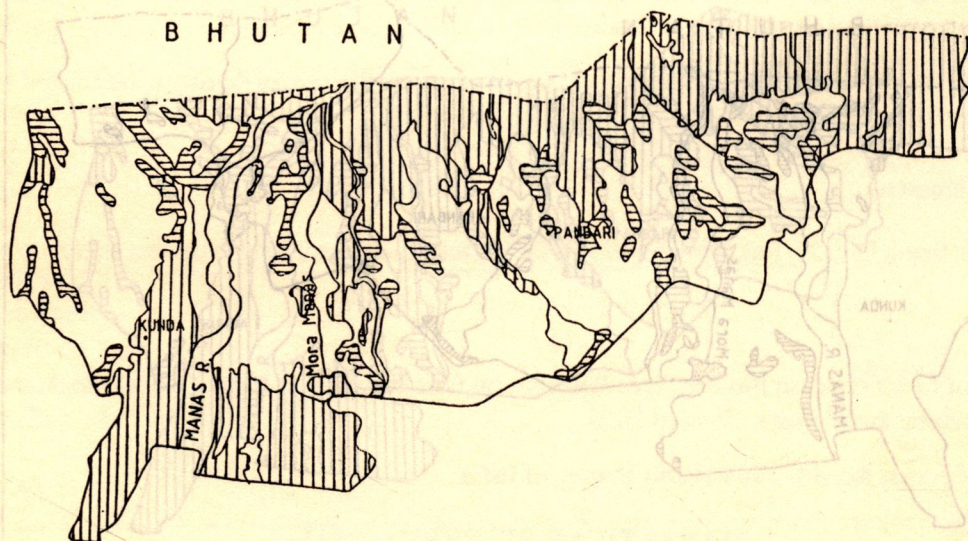
[W] + - CG = R

H

Assistant Director, Manas Tiger Reserve, Goalpara & Kamrup, Assam

Manas Tiger Reserve

VEGETATION MAP OF
MANAS TIGER RESERVE, GOALPARA & KAMRUP, ASSAM
(BASED ON VISUAL INTERPRETATION OF LANDSAT IMAGERY 1991-93)
SCALE 1:250,000



DETAIL	Symbol	Area in km. ²
1. DENSE FOREST-Crown Density above 40%		164.76
2. OPEN FOREST-Crown Density 10 to 40%		45.07
3. NON-FOREST INCLUDING WATER BODIES		260.17
TOTAL AREA		<u>470.00</u>

INTERPRETATION PROGRAMME - BOON IN THE PARK ECO-TOURISM

By
Jagdish Chandra, ACF.*

INTERPRETATION is an act of explaining the meaning in a specified manner, elucidation, show the purport of; translation into intelligible or familiar terms.

Principles of Interpretation:

As described by Freeman Tilden (1883-1980) :-

- I. Any interpretation that does not somewhat relate what is being displayed or described to something within the personality - of the experience of visitor will be sterile.
- II. An art, which combine many arts, whether the materials presented are scientific, historical, or architectural. Any art in some degree is teachable.
- III. Information, as such, is not interpretation. Interpretation is revetation based upon information. But they are entirely different things. However, all interpretation includes information.
- IV. Interpretation should aim at presenting a whole rather than a part, and must address itself to the whole process rather than any phase.

Goals of Interpretation:

I. In ralation to the site:

- Foster proper use.
- Develop advocates for the site.

II. In reation to the agency:

- Enhance image of agency.
- Encourage public participation in management.

III. In relation to the visitor:

- Provide recreation.
- Heighten awareness and understanding of their natural and cultural environment.
- Inspire and add perspective to their lives.

Interpretation as viewed through the following formula: (J.Chandra, 1995),

$$\left[\frac{W}{H} \right]^6 + - CG = R$$

* Assistant Director, Pench Tiger Reserve, Seoni & Ex-Asstt. Director, Kanha Tiger Reserve.

where,

W= what	(what is interpretation?)
W = why	(why interpretation?)
W = when	(when interpretation is needed?)
W = where	(where interpretation should be done?)
W = who	(who will do the interpretation?)
W = whom	(interpretation for whom?)
W = how	(how interpretation is to be carried out?)
CG= communication gap	
R = result	(The ultimate come of the interpretation)
±	Lesser (minus), the CG, better the result will be and vice-versd.

THE KANHA INTERPRETATION PROGRAMME.

Introduction:

Contained between latitudes 22° 07'N to 22°27'N and longitudes 80°26'E to 81°03'E, the Kanha National Park was notified on 01.06.1955.

Covering an area of 940 sq. kms. of "Core Zone" and 1005 sq.kms. of the "Buffer", in Mancia and Balaghat districts respectively, the Kanha was among the first nine Tiger Reserves to be launched under the "Project Tiger" in 1973.

Known for its renowned floral and faunal compositions, the park's heritage is very well interspersed with Maikal ranges of the Satpuras. The "Banjar" valley and curvaceous "Haldon" valley, breaking through the Maikal gorges and extensive grasslands (manmade), harbours a typical Central Indian fauna including the branderi barasingha (*Cervus duvauceli branderi*).

Predominantly, sal (*Shorearobusta*) is distributed in the valley at different levels, mixed with bamboo and miscellaneous deciduous forest cover on the plateau, locally known as Dadar.

In tune with the objectives of Project Tiger and wildlife conservation programme, around 25% of the National Park area is thrown open for the tourism (Rajesh Gopal, 1992).

Kanha has the unique distinction of being the first Tiger Reserve in the country where a full fledged park interpretation programme has been launched.

The initial interpretive plan for Kanha was prepared during the year 1983, which has gradually metamorphosed into the present form. Now, a separate interpretation wing is operating for this purpose.

Tourism :

Unlike Rajasthan, Himachal Pradesh, Maharastra and other advance states, the tourism in the state in Madhya Pradesh is still lagging far behind.

According to Dr. Negi, a senior member of teaching and research faculty, tourism can be understood easily through the following equation :-

$$(N + W + M) EE = \text{Tourism}$$

Where N = Nature
 W = Wildlife
 M = Man
 E = Environment
 E = Ecology

Pertaining to the wilderness areas of Madhya Pradesh, tourism is mainly confined to Bandhavgarh, Madhav (Shrivpuri) and the Kanha National Park, Mandla.

Details of the tourist who visited the Bandhavgarh and Madhav National Parks are given in Table No.

1.

Table-1
Showing the tourists arrival in the parks for the last 10 years:

Year	Madhav National Park (Shivpuri)			Bandhavgarh National Park (Umaria)			Kanha National Park (Mandla)		
	Indians	Foreigners	Total	Indian	Foreigners	Total	Indians	Foreigners	Total
1981-82	19094	147	19241	3861	228	4089	14473	725	15198
1982-83	21986	152	22138	3970	186	4156	13335	348	13683
1983-84	22544	56	22600	3260	270	3530	22560	578	23138
1984-85	18362	91	18453	4089	240	4329	22442	747	23189
1985-86	20964	111	21075	4820	669	5489	27854	504	28358
1986-87	25403	83	25486	5446	1290	6736	38791	1364	40155
1987-88	27074	199	27273	6243	594	6837	42205	1052	43257
1988-89	30747	256	31003	9281	678	9959	38828	996	39824
1989-90	34473	1357	35830	12052	796	12848	38603	1371	39974
1990-91	4082	258	4340	8079	318	8397	38390	2200	40590

Source :- Ph.D. Thesis. (P. Singh, 1991).

The figures mentioned in the above table are as per the tourism records. Whereas, the actual number of the tourists who visited Kanha National Park (dates taken from the park records), for past 25 years are given in Table No. 2.

Table-2
Showing the tourist arrival at Kanha, data of 25 years:

	Year	Indians	Foreigners	Total
Jan.;Dec	1971	3305	165	3470
"	1972	3083	228	3311
"	1973	4385	126	4511
"	1974	3516	307	3823
"	1975	3730	300	4030
"	1976	4120	380	4500
"	1977	6962	333	7295
"	1978	6678	367	7045
"	1979	6084	330	6414
"	1980	7045	393	7438
"	1981	13456	962	14418
"	1982	15835	735	16570
"	1983	19742	363	20105
"	1984	33952	568	34520
"	1985	22861	479	23340
"	1986	27959	514	28473
"	1987	38890	1384	40274
"	1988	42256	1062	43318
"	1989	38825	996	39821
"	1990	38603	1371	39974
"	1991	34621	2620	37241
"	1992	51595	3807	55402
"	1993	53522	2436	55958
"	1994	39876	2485	42361
"	1995	34665	2439	37104

Thourism in Knha national Park in relation to the wildlife conservation, gets high priority. Infact, it is "Eco-tourism" in the sense that the tourists are informed about the message of wildlife and biodiversity conservation through the interpretation centres, museum and the park rounds followed by film shown at night.

As mentioned before, about 25% of the park area is permitted for tourism, i.e. around 235 sq. kms. of area is open. The estimated "carrying capacity" of this area is around 30,000 tourists per year (R. Gopal, et. al: 1993).

However, a maximum of 55,958 tourists visited during the year 1993, of which 4.36% were foreigners (Table No. 2).

During the peak tourist season, which normally falls in December-January and April-May months, the maximum number of tourists visit the park. The park remains closed for the tourists from Ist July to 31st October, each year (Table No.3).

Table-3
Showing monthwise arrival of the tourists in Kanha Tiger Reserve :

Month	1991			1992			1993			1994			1995		
	Indian	Foreigner	Total	Indian	Foreigner	Total	Indian	Foreigner	Total	Indian	Foreigner	Total	Indian	Foreigner	Total
JAN.	4183	340	4523	5827	357	6184	8895	526	9421	6473	340	6813	4342	345	4687
FEB.	3024	336	3360	4763	743	5506	5205	307	5512	3910	412	4322	3824	426	4250
MAR.	3310	609	3919	4170	795	4965	4933	472	5405	3612	546	4158	3256	327	3583
APR.	4272	294	4566	4022	556	4578	5642	284	5926	3713	371	4084	4117	407	4524
MAY	5004	39	5043	8851	90	8941	7340	41	7381	6694	107	6801	5256	74	5330
JUN.	3362	14	3376	8799	39	8838	5407	20	5427	2909	45	2954	4545	41	4586
NOV.	6782	264	7046	7704	417	8121	7462	262	7724	5823	378	6201	5184	463	5647
DEC.	8381	963	9344	8396	369	8765	6153	258	6411	6742	286	7028	7397	358	7755

- 721 tourists entered the park on 29th Dec. 1991.
- 697 tourists entered the park on 1st Jan. 1992.
- 854 tourists entered the park on 1st Jan. 1993.
- 593 tourists entered the park on 13th Feb. 1994.

This much large number of the tourist vehicles, plying on the park roads in a single day, hardly allow the visitors to see any animal, but for the dust.

This situation calls for an attention, as to, how to plan and regulate the tourists visit inside the park, so that it does not become a menace for the wild animals, the tourists, the park management and the environment of the park.

If we peep into past ten years figures of tourists entry in the park through two entry gates viz. Khatia and Mukki, we observe that, the number of the tourist entering from Khatia gate is around 2 to 2.5 times more, as compared with the Mukki entry gate (Table No. 4).

Table-4
Showing the tourists entry from Khatia & Mukki gates

Year	Khatia	Mukki	Total
1986	20382	8091	28473
1987	29222	11052	40272
1988	29810	13508	43318
1989	28097	11727	39824
1990	28163	11811	39974
1991	23309	13932	37241
1992	28993	16409	55402
1993	38484	15038	53522
1994	30873	14280	45153
1995	24478	10042	34522

The above figures reveal that, visitors coming to Khatia via. Jabalpur/Delhi, feel more convinient as compared to those who come Mukki via. Balaghat, Raipur, Gondia etc. Therefore, the number of tourists entering through the Khatia gate is much higher. Hence, this gate is more succceptible and needs more attention and care, as regards tourist management.

Apart from the limited departmental accomodation available near these two entry points, boarding and lodging facilities are also provided by the M.P. State Tourism Development Corporation, at the Safari lodge Mukki, the Log huts and the Youth hostel at Kisli.

Kisli is 3 kms. ahead of Khatia towards Kanha. Beside this, private stakeholders, Dhabas are also available near these two entry points.

The tourism management :

The Kanha National Park has a set of rules for regulating the tourism. The park management provides guide, on hire, to every tourist vehicle which is a compulsory component to carry with.

In fact, they are route guides, who are well versed with park roads, rules and regulations. They are also informed about the basic knowledge of animal identification, but not well versed with the technical and scientific knowhow.

The park management also provides elephants, on hire, to the tourists to go in the park from the stipulated spots, to take joy rides and to view the tiger, if luck favours them.

Only light vehicles (4 wheelers), are permitted for the park rounds, heavy and diesel vehicles are not allowed. Pedestrians (tourist) are also not allowed to go in the park. However, they can move on foot on to the Nature Trail made for them at Khatia.

During the park round, the tourists are permitted to get down from the vehicles at certain places for drinking water, nature's call and to dialogue with the park staff. These places are Bamhni dadar, Sondar, Kanha, Bishanpura, Auari, Ghorela and Sonf.

Viewing the chital, brarasingha etc., amidst meadows from a vehicle and spotting the tiger from elephant back are the major attractions for the visitors.

The park interpretation :

As stated earlier, the interpretation means how the things, their meaning of, the interaction, elucidation and the like, is carried out, so that the purpose is understood.

Hence, the Kanha park interpretation programme envisages education cum orientation of the tourists towards the knowledge of wildlife and biodiversity conservation, so that, the visitors develop a sense of awarness and understanding.

Two visitor centres, one each near the two entry points at Khatia and Mukki, alongwith a museum complex at Kanha are available for the visitors. The U.S. National Park Services has supported the scheme with technical guidance, apart from providing funds for the preparation of various exhibits, signals and diagrams. An audio-visual presentation also exists in the interpretation programme. The fabrication work was done by Centre for Environmental Education (CEE), Ahmadabad.

With this meaningful park interpretation programme, at Kanha, concerted efforts are underway to make it more effective by stocking the archives with films, video cassettes, audio-visuals and publicity material.

At present the situation warrants the support and sympathy of the rural masses living close to the park periphery. In fact, the very existence of the wilderness depends on this. This is a "Himalayan" task and needs every one's cooperation.

The interpretation is not a short sighted exercise for the selected ones. It has been designed for the locals as well, every care has been taken to display the depictions in Hindi also. Thus, the park interpretation programme launched at Kanha has a holistic approach of the purpose (Rajesh Gopal et. al., 1993).

Discussions and Suggestions :

The park interpretation programme is of its own kind introduced for the first time in India's wilderness area.

As it has been fabricated by a reputed agency, the C.E.E., Ahemadabad, through Govt. of India and the Govt. of M.P. under the Indo-U.S. interpretation project.

However, looking into the field conditions of the park and experiences gained over the years, the following suggestions for further improvement can be considered:

1. The hightech electronic systems provided at Khatia, Mukki and Kanha centres need a regular check up and maintenance by the skilled engineer's or technicians, so that the faults do not occur frequently.
2. Time taken at the jungle seen at night in the Kanha museum should be curtailed from 20 minutes to 10 minutes, so that the visitor can spend the saved time in other activities of the park.
3. Material provided for sale at Khatia and Mukki visitors centres need to be modified with new introductions. For which, the Kanha Worker's Society, run by the park officials, is already stepping into.
4. Feed back about the park, the interpretation programme and the guide should be regularly obtained from the visitors to remove the lacunae.
5. Quarterly meetings between the park management, the tourism staff and the private (registered) stakeholders should be organised to bridge the communication gap.
6. An English speaking person should be kept at each interpretation centre to convey the information to the foreign tourists.
7. Uniformity of rates for boarding, lodging and transportation should be maintained, by the forest and the tourism department so that, the private hoteliers and vehicles owners do not exploit the visitors.
8. A device to check air pollution should be kept at Khatia and Mukki entry, so that, the vehicles emitting excessive carbon smoke could be checked.

9. Number of vehicles entering in the park should not be more than 18 - 20 per day, that means around 125 to 150 tourists. Thereby allowing 30,000-35,000 tourists per year, which will be in tune with the carrying capacity of the park.
10. Participation of private stakeholders and Village Forest Committees in the planning process should be encouraged.
11. Training of park officers and other staff pertaining to public relation and tourist management should be organised.
12. Involvement of the local villagers through the Village Forest Committees (VFC) or society, be assured so that their cultural heritage and local handicrafts, artifacts are popularised, through tourism.
13. Departmental vehicles upto 15 seaters should be provided for general public (Janta class), and students on concessional rates.
14. Slide shows and lectures concerning the wildlife management and biodiversity conservation should be regularly organised by the park authorities.

Conclusion :

If each tourism, recreation and conservation entity saw, as a part of its role, in its interface with the other segments, there would be great progress towards improved environmental protection and use for society (J.V. Singh, et.al., 1982).

There is an old saying pertaining to Kanha, that the best interpretation for the park is hidden in [T].

T = time,	timely movement in the park.
T = table,	the dinning table.
T = tiger,	the king.

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BLACK BUCK, THE ROMANTIC ANTELOPE

By
Kr. Atul Raj Singh*

UNLIKE Africa, India is not a country of antelopes. There are only a few species of antelopes to be found in the sub-continent. Best known to the lovers amongst the antelopes is the Black Buck (*Antelope cervicapra*). It is the only representative in India of the genus antelopes. Black buck is exclusive to India and is unrivalled in beauty, elegance, dexterity and perfectness. These characteristic features are a part of its physical make up.

The rich black coat and long screw horns are its distinctive characters. At a young stage the buck resembles a doe. But gradually in second and third year it changes colour-from a brownish tint to more or less black and horns from tiny little pegs to spired twists. The change in the seasons and the variation in the lushness of the fur is evenly balanced. In the hot dry season, it fades away a little, while the winters bring the rich lustrous coat back again. On the other hand females are all of the same colour, ie; yellowish fawn and remain the same throughout. The under part muzzle and rings around the eyes are creamy white in colour, that make the black buck most handsome of all its cousins.

The black buck is at a disadvantage as regards the sense of smell and hearing but a keen eye sight and terrific speed more than compensates and keep him ever on alert. When alarmed the herd moves off in series of light leaps and bounds and then breaking into a gallop. It is a finely built animal, the height at the shoulders is about 80 cm. and weight about 40 kg. The horns are beautifully spired having twists like a cork screw. In the first year no twists or rings are visible but over the years they gradually develop. Horns longer than 18 inches are rare, though this author recently spotted a buck with 24 inches horns.

In the past large herds of black buck roaming along cultivated fields and fallow land was a common sight in the districts of Agra, Aligarh, Badaun and Bijnor. In our estate, in district Bijnor one could see hundreds of black bucks grazing in cultivated fields, yet no one dared hurt them for fear of punitive measures inflicted by us. But over the last three decades the population of black bucks declined sharply due to indiscriminate killing of these animals throughout the Indo-Gangetic plains of western Uttar Pradesh. These areas once dominated by black bucks have now been infested with Nilgai (*Boselaphus tragocamelus*). The black buck has been pushed to the brink of extinction.

But of late the black buck has registered a come back, thanks to the concerted efforts of some conservationists, especially that of my family. The first black buck was spotted in my estate in November, 1993 and ever since they are on the increase, due to the keen interest shown by my family members. We keep strict vigil on the village poachers and do not disturb the antelopes, even though they damage our crops. Today I can say with confidence that more than a dozen black bucks are inhabiting my farm.

Black buck is an animal of dry plains and grassy tracts. It does not like swampy areas. But strangely enough the herd at my farm spends a good deal of time in sugarcane and paddy fields, which are rather wet and swampy. I know of an incident where a buck was shot, in a beat, in the swampy Ganga khadar. How did he happen to go there puzzled every one as the nearest black buck habitat is miles away.

The black bucks love to feed upon the crops and sproutings of the burnt grass. I have seen them

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plucking wild *ber* fruits, which they seem to be very fond of. On another occasion I was zapped on seeing a herd licking urea fertilizer that had been sprinkled in a field. They quite seemed to enjoy it.

Black bucks are known for their great herding instinct and one is invariably bound to follow the other. The leadership is entrusted to a doe and it is almost impossible to distract even a single buck from the course taken by her.

Chasing a herd with motor vehicle was at one time considered a great adventure. Friends known to me had mastered the art to perfection. At times more than one vehicle was used for *nakabandi*. The competition lay in as to who hit the buck first. At a speed of 50-55 miles per hour, the vehicle would come right in the middle of the galloping herd. On seeing the vehicle amongst them, the herd begin jumping straight up like a released coiled spring and landing on the same spot. Unable to out run the vehicle they are easily bagged. This reminds me of one incident. A bunch of local shikaries were after black bucks. They preferred to first run them down and then shoot. A long chase followed and eventually the herd took cover in a tall *bajra* field. The shikaries unmindful of standing crop madly followed the herd. The other end of the field had a drop of over 13 feet, culminating in a dry *nala*. The vehicle in top speed shot in the air over the *nala*. Luckily the vehicle landed on its four wheels. Though no body was seriously injured the jonga no doubt was a piece of scrap. Yet in another incident a jeep fell into a well, killing a number of its inmates.

Abul Fazal in *Ain-a-Akbari* mentions about black buck trapping, which reads; "A net is put over the horns of a tamed buck, which is let off against wild ones. The tamed one due to fear will fight with them and during the straggle the horns or the feet of the wild bucks get entangled in the net. The hunter who would be sitting in the ambush would then run up to it and catch it. The bucks were so trained that if the net would break or the buck got tired during the struggle it will return to the keeper, who either puts a new net on it or sends out a new buck. Once a leopard was caught as its leg got entangled in the net".

He further says; "Only lately a buck created much sensation. It had run away from Allahabad and after bravely crossing rivers and plains returned to Punjab, its home and rejoined its former keeper". Such a feat seems incredible but the authenticity of the author cannot be doubted.

The highest speed a buck can attain is about 40-50 miles per hour. I once witnessed a scene in which some hounds were chasing a buck. The initial gap between the dogs and the buck became wider and wider in the chase and the hounds miserably failed to catch the buck.

Black bucks were often ridden down by horses, though it is not an easy task as only a highly pedigreed and trained horse mounted by skilled rider can perform such a feat. In fact much depends on the condition of the ground. Hard and grassy tracts are in favour of the horse and he holds better chances of running down the buck. In the summer months or on a hot day a buck is liable to get exhausted much more quickly. To the last ounce of vitality the buck is on the run, failing which it collapses.

Winter is the season for the rut. During this period the facical glands of the buck are greatly enlarged. They are seen thrusting their noses frequently upwards, as if trying to smell some thing in the air. Lone big males rejoin the herd at the commencement of the rut. Being pugnacious during this period, they fight fiercely with each other to keep their individual hold on the harem. During the fight the bucks are least bothered about approaching danger and they can be easily stalked from a few yards.

The gestation period is about 6 months. Generally the female gives birth to one fawn and very rarely to two. Black bucks are excellent breeders and are known to breed in captivity all the year round. Disturbance in the antelope habitat and indiscriminate poaching are responsible for sharp decline in its population. And due this reason it now holds a rank in the list of the endangered species.

“BIOLOGICAL OBSERVATIONS ON CERTAIN BIRDS DURING TOTAL SOLAR ECLIPSE IN KEOLADEO NATIONAL PARK”.

BHARATPUR (RAJASTHAN)

By

M.M. Trigunayat

Key words: Total solar eclipse, *Anhinga rufa*, *Nycticorax nycticorax*, Biological clock, exogenous and endogenous stimuli.

Abstract:

City of Bharatpur fell enroute to the total solar exlipse on October 24, 1995, Total darkness for more than 38 seconds coupled with considerable drop in temperature influenced the activity patterns of many diurnal and nocturnal birds. The present communication deals with some observations on Darter, (*Anhinga rufa*) commonly called snake birds and Night-Heron, (*Nycticorax nycticorax*.) It is inferred that the total solar eclipse has influenced call and communications, perch shifting and resting behaviour in Night-Heron. In case of Darter, no deviations as compared to normal activity were observed.

Introduction:

City of Bharatpur observed total solar eclipse (TSE) on 24th Oct, 1995 between 8.34.04 and 8.34.43 being maxmium at 8.34.24. The total darkness caused by TSE and considerable drop in temperature influenced various behavioural patterns of many birds in the park. Darter is diurnal and Night Heron is a crepuscular and nocturnal (Ali, 1979) permanent inhabitants of the park. Since the photoperiod affects the diel periodicity of birds and animals, therefore, the present study was undertaken to assess any shift in the normal activity patterns of these birds during TSE. The adverse effect of solar eclipse on birds and mammals, however, are available. (Bochenski, 1960; Mejlert, 1975; sharma, 1980; Rao, 1980; Bhartiya et al, 1983; Sengupta, 1983; Trigunayat, 1996; Chhangani et al., 1997.)

Study Area:

Keoladeo National Park (KNP) is located within the geographical co-ordinates 27°.7' to 27°.12.2' N. latitudes and 77°.29.5' to 77°.33.9' E longitudes. The total area comes out to be 29 Sq.Km, with a central depression of about 8.5.Sq.km. constituting wetlands. It remains waterlogged in winters and dries in summers. KNP receives water supply from a nearby Ajan Dam, through a canal. The park envisages diverse habitat ranging from grassland, scrub jungle, lakes to woodland and thus, offers rich Biodiversity. Mansarovar is a site in the heart of park, near Keoladeo temple (after which park is named as, Keoladeo) retains water throughout the year and thick canopy around the margins of this permanent pond offered permanent roost for Night-Herons. (For detail information on study area, refer to Ali and Vijayan, 1986).

Materials and methods :

The stipulated site for proposed observations was scanned thoroughly with a pair of 10X50 optima zenith Binoculars from a distance of 250 meters. Observations on overall activity patterns with special reference to any shift in behavioural activities, were undertaken. The observation were recorded two days before the day of TSE, which served as normal (control) as early as 6.30a.m. and continued till 10.35a.m. during the study period.

Observations :

The entire phenomenon was evidenced and recorded for even slightest movements. The exact time hours and activity pattern as revealed by these birds were as follows:-

- 6.30
22 Night Herons including 6 juveniles and two Darters were seen at the observation site. Eight of the adult Night Herons were showing their beaks tucked either in scapulars or breast region. One of the two Darters, was swimming and other drying soaked wings on a wooden log half submerged in water.
- 7.00
Preening activity was started by some of the Night Herons. Primary feathers, breast and vent region appeared to be the chief preening areas. The Darter turned side face towards sun and preened breast and primaries. Afterwards bobbed head downwards.
- 7.19
One of the adult Night Heron shifted perch from adjoining branch extending a low pitch call, others were peeping to the water surface. Darter preened for about more than one minute at breast region and grew conscious, stretched its neck little further.
- 7.30
One of the adult Night Heron came flying from nearby roost at 200 meters distance and settled adjusting and readjusting to the extent of its satisfaction. Swimming Darter, now took dive and disappeared for about 42 seconds and appeared near periphery but without any fish.
- 7.46
Preening Night Herons flapped their wings and shivered them to settle comfortably. Darter changed its posture to front side facing towards sun, probably for drying wings from all sides.]
- 7.55
Darter lodged the wings back in position. Looked around and flew away.
- 8.10
The sun light started diminishing, approaching towards evening like scenario with sudden drop in temperature which caused a wave of shivering. A few Night Herons were seen exposed at the top branches of *Acacia nilotica* (Babul) and majority of others started to seek hide under thick branches, few of them shifted perch. Several low pitch calls were heard. Darter took dive and reappeared after about 16 seconds with its beak holding a small fish to be gulped in a single attempt.

8.16

Many other birds within the range of Binoculars, started leaving the feeding grounds. The flock of Little Cormorants, Egrets, Pied Myna, Shovellers and Pintails were seen flying just overhead. Certainly they were coming back to their roosts. The birds which were heard by calls include Sarus crane, Red wattled lapwings and Rose ring para keets. A fair increase in calls was recorded. Dusk spread all over and most of the birds were seen in haste to come back to their roosts.

Darter came out from water and settled on a half submerged log, opened the wings to spread for drying.

8.33

Light became faint, Darter lodged the wings back in position and grew conscious. It appeared as if it was unable to choose between to flee or not to flee. Night Herons extended sequence of calls one after other as if they were communicating something. A few of them shifted perch from adjoining branches.

8.34

To the great surprise, darkness spread abruptly all over and Night Herons left the roost extending high pitch calls in succession creating a shrilling noise of **Kowrk-Kwork-Kowrk.....** Nothing could be seen in total darkness. When light resumed after few seconds, their number rose to just double of the initial count. Evidently, these birds (Night Heron) were already there under thick canopy but escaped binoculars.

8.36

The disturbed Night Herons began to adjust on nearby tree. A few of them were securing top positions and others extending low & high pitch mixed calls.

9.15

Darter partially opened the wings, retracted them back in position and looked around twice and then flew to a nearby perch. Night Herons resumed preening.

9.55

Darter still sitting at the same perch. 4 Night Herons (juveniles) secured position in the middle branches, others extended low frequency calls. Three adults flew away disturbing the whole roost. At that very moment a Marsh Harrier, common predator of birds and water fowls in the park, was seen flying just over head.

10.10

Three Night Herons one after other, flew to nearby tree. Darter resumed preening. It started from breast region and ended up at primary feathers.

10.35

Only eight Night Herons were seen preening at top branches. Darter still sitting at the same perch. The roost appeared as normal as before.

Result & discussion :

The present observations revealed a clear shift, as compared to normal activity, in certain behaviours such as call and communications, perch shifting & resting in Night Herons, whereas Darter did not show any deviation in the said activity patterns. On normal days (a day before the day of total solar eclipse) Night Herons extended calls & shifted perch frequently at dusk whereas an increase in these activity patterns during TSE was observed indicating a clear cut influence. The other birds like Little Cormorants, Egrets, Ducks, Pied Myna returned back to their roosts though it was not a roosting time. It is, therefore, inferred that the Biological clock in most cases under observation, seems to be influenced by TSE.

The 'Clocks' are influenced by exogenous such as temperature and light regimes and endogenous (some internal senses) stimuli (Aschoff, 1960). Temperature & light are those external variables that are known to affect the circadian rhythms (Farner and King 1975). Since the TSE brought considerable drop in temperature and this total darkness coincided with mornings which otherwise remained fully illuminated on other days.

During TSE the influx of radiations that reached on earth surface were reduced and the corpuscular and electromagnetic nature of these radiations brought out changes in the variables such as light, temperature humidity, pressure etc. which influenced the circadian rhythms. Large number of birds responded to these variables, sensing this momentary darkness caused by TSE, as real dusk. It is, therefore, concluded that the Biological clock of Night Heron seems to be influenced by exogenous stimuli. In case of Darter, since no deviations were observed with reference to normal activity, therefore, it is concluded that the Biological clock of this diurnal bird remain uninfluenced during TSE suggesting some endogenous control mechanisms.

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AN ACCOUNT OF MAMMALS OF HARIKE LAKE, PUNJAB.

BY

N.K. Sinha*

Introduction

The man made Harike Lake, Amritsar, Punjab is situated at long. $31^{\circ} 13' \text{N}$. and Lat. $75^{\circ} 12' \text{E}$. and at an elevation of 218. 83 metres. A barrage measuring 636.12 metre in length and 10.06 metre in height was constructed about three kilometre down stream from the confluence of river Satluj and river Beas at Harike township in 1952. The barrage was constructed with the primary objective of storing water for irrigation and supply of drinking water in parts of southern Punjab and adjoining areas of Rajasthan. The water so accumulated at Harike forms a lake, triangular in shape with its apex in the west. The wetland area is spread over about 148.00 sq. km. of which 41.00 sq. km. is of open water which has now been reduced to about 28.00 sq. km. due to silting and encroachment. The water hyacinth has further covered the water body over an area of 7.04 sq. km. and 31.65 sq. km. has been lost due to growth of weeds (Gill and Sharma, 1993).

Due to impoundment of water at Harike, the water level in the river increased and Harike lake has been formed. Apart from increase in the water level, the surrounding areas also got affected and marshy conditions prevail in larger area on both sides of the river and its confluence point. The water storage capacity of the Harike lake is 67,900 acre feet (Ladhar *et. al.*, 1994).

Interspersed in the lake area, a large number of islands of varying size and shape have been formed due to deposition of silt and growth of vegetation, more particularly of Sarkanda and other tall reed grasses and bushes. This area is commonly called "Mand". The mand area makes an ideal abode for a variety of wild fauna. The water in the lake is clear with a large growth of under water vegetation, important among them are *Hydrilla*, *Potamogeton*, *Vallisneria* and many species of algae.

The Harike reservoir due to its extensive catchment and vast surroundings has provided water to meet the irrigation needs to a great extent of agriculture as well as the domestic requirement of the people living in the area. Besides the above it also attracts one of the largest congregation of aquatic birds, a great many species of mammals and a large variety of fishes.

The Harike lake was declared as a wildlife sanctuary in 1982. The boundary of the sanctuary was redefined in 1992, when this wetland was declared as a Ramsar site of international importance under the Ramsar conservation in 1990. The area of Harike Wildlife Sanctuary is 86.00 sq. km. of which 73.00 sq. km. constitutes wetland enclosing shallow, marshy tracts that serve as perfect feeding and wading habitats of wild fauna. The Harike Wildlife Sanctuary was also selected as a special conservation action and management area by the National Committee on wetlands, mangrooves and coral reefs, Ministry of Environment & Forests, Govt. of India. (Ladhar *et. al.* 1994).

A total of 16 mammalian species have been recorded from the Harike lake Wildlife Sanctuary by the author out of which the Smooth Indian Otter (*Lutra perspicillata*) is a threatened animal (IUCN, 1994). The classification is followed after Wilson & Reeder (1992). The details of distribution and other characters were after Prater (1971) and Sinha (1992, 1994 A and 1994 B).

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SYSTEMATIC ACCOUNT

Phylum	:	CHORDATA
Class	:	MAMMALIA
Order	:	INSECTIVORA
Family	:	ERINACEIDAE

1. *Hemiechinus auritus* (Gmelin)

Long-eared Hedgehog

1770. *Erinaceus auritus* Gmelin *Nov. Comment. Acad. Sci. Petrop*, 14: 519.

(Type locality: Astrakhan, south eastern Russia)

Diagnostic characters: Snout pig-like with clumsy body, short tail, stumpy legs with claws. There is a dense mat of spines which cover the back and sides. During danger, the Hedge-hog roll their body into a ball of bristles.

Distribution: **India:** Punjab, Cuttck, Gujrat, Rajasthan, Himachal Pradesh.

World: Cyprus, Asia Minor, Persia, Afghanistan, Chinese Turkistan, Monogolia, Russian Turkistan, north to Altai steppe, Caucasus, south east Russia, SriLanka.

Remarks: Hedgehog is nocturnal, taking shelter during day in the holes in sand or beneath thorny bushes or grasses, but comming out to feed at dusk and retiring again at dawn. It is omnivorous and feed on insects, worms, slugs, lizards, rats, mice and eggs of vertebrates, various kinds of fruits and roots. The species covers long distances in the rambles, going at a steady trot,

Family : SORICIDAE

2. *Suncus murinus* (Linnaeus)

House Shrew

1766. *Sorex murinus* Linnaeus, *Syst. Nat. 12th. ed.*, 1: 74. (Type locality: Java).

Diagnostic Characters: The long pointed snout projecting beyond the lower lip, two front curved teeth, depressed ears, small eyes, with feet and tail sparsely clad with hairs, make them easily identifiable from rats.

Distribution : India: This is the commonest shrew in India and is found throught the Indian subcontinent.

World: Throughout the temperate and tropical regions of Europe, Africa, North America and Asia.

Remarks: Shrews are nocturnal and enter houses in search of insects. The loud squeaking cry and unpleasant musky odour are instant causes for their being killed. They are useful animals and get rid of cockroaches and other pests. Shrews are intolerant to rats and drive them away. It is generally believed that the food articles it touches, get contaminated, which is not true. Two or three youngones are born at a time and are very active after birth and follow their mother by holding her tail, one after another, in a trailing fashion.

Order: CHIROPTERA
Family: PTEROPIDAE

3. *Pteropus giganteus* (Brunnich)
Indian Flying Fox

1782. *Vespertilio gigantea* Brunnich, *Dyrenes Historie*, 1: 45 (Type locality: Bengal India).

Diagnostic Characters: The large size with black wing makes it easily indentifiable. Head usually reddish brown with a darker sometimes blackish snout. Hind neck and shoulders pale brownish yellow to straw. Ventrally yellowish-brown.

Distribution: India: Widely distributed in peninsula, northward to Rajasthan, Gujrat, Punjab, western to eastern Himalaya, Assam and Manipur.

World: Sri Lanka, Nepal, Bhutan and Myanmar.

Remarks: The largest of Indian bats, usually seen flying with slow wing beats at dusk. Roosts on trees, often in the midst of busy town and villages. They usually leave the roosts immediately after sunset. The species fly to great distances on same route day after day in single file. They have great memory of fruiting time and location of orchards. A very destructive creature of fruits, feeds only on juice of fruits, extracted by chewing dry the fleshy pulp, which is spat out. Breeds once a year in February after a gestation period of 140 to 150 days. Single youngone is born which is carried by mother for considerable time. Their flesh is eaten in many parts of the country.

Order: CARNIVORA
Family: CANIDAE

4. *Canis aureus* Linnaeus
Asiatic Jackal

1758. *Canis aureus* Linnaeus, *Syst. Nat. 10th. ed.*, 1: 40 (Type locality: Province of Lar, Iran).

Diagnostic Character: Deep chested body with long slender limbs and bushy tail. The muzzle is long and slender, and the ears are large and erect. The first digit of the fore foot and the hind foot are reduced. The species is pale dirty yellow mixed with reds and blacks and has a reddish-brown tail.

Distribution: India: Throughout.

World: South-eastern Europe, south-western Asia, Nepal, Sri Lanka extending a little into Myanmar and south-eastern Thailand.

Remarks: A best adapted animal to its environment. The Asiatic Jackal is found in India anywhere from humid forests to dry open plains or deserts and upto 3660 meters in Himalayas. The species lives in holes on the ground or in dense grass and shrubs. Jackal's call is eerie, the howling at night is perhaps most familiar to most people than the animal itself. There is no distinct breeding season.

5. *Vulpes bengalensis* (Shaw)

Bengal Fox or Indian Fox

1800. *Cuon bengalensis* Shaw, *Gen. Zool.* (1) 2: 330 (Type Locality: Bengal, India)

Diagnostic Characters: Slender limbed animal similar to jackal except for its size which is smaller. It has distinct black tipped tail. Animals found in northern India grow handsome winter coat. General colour is grey, purer grey in winter contrasting with the rufous limbs.

Distribution: India: Throughout.

World: North-west of India over the greater parts of northern hemisphere as far as shores of Arctic lands, Pakistan, Iran and Tibet.

Remarks: Similar to Jackal, the species is also inhabitant of open country, lives in burrows in wasteland and cultivated fields. The Indian fox is nocturnal. Food comprises of small mammals, reptiles, crabs and insects. They also feed on melon, gourds, ber fruits, shoots and pods. Those living near human settlements enter compounds and gardens, but seldom attack poultry. The mating takes place in winter and the youngones, numbering usually four, are born in late winter and spring.

Family: MUSTELIDAE

6. *Lutra perspicillata* Geoffroy

Smooth-coated Indian Otter

1826. *Lutra perspicillata* Geoffroy, *Dict. Class. H.N.*, 9: 519 (Type locality: Sumatra)

Diagnostic Characters: Coat smooth and sleek. Colour blackish to rufous chocolate-brown, sometimes sandy or fawny brown. Dorsal fur not grizzled. The hairs of the muzzle terminate in a straight line above the naked part of the nose.

Distribution: India: Widely distributed from Himalayas to southern India, Assam, U.P. Terai.

World: Pakistan, Nepal, Myanmar, Indo-china & Malaya states, Sumatra, Western Yunan.

Remarks: Essentially a plain's Otter, although it ascends low elevation hill ranges. Lives on the margin of lakes, reservoir, streams and large tanks. The Indian Otter hunts in flooded fields, creek and estuaries and even follow fish in the open seas. They readily change their habits in dry season when the water bodies dry up and take to jungle hunting like other land carnivores. Food consists of mainly fish when available otherwise whatever they can catch. Essentially their body is built for aquatic life but they are also perfectly active on land and can go long distances in search of food and water. A joint family efforts are also made for fishing. A semi-circle is made with the individuals keeping a distance of about 40 to 45 meters and then they drive the fish forward. Every now and then one Otter will dive

and emerge with a fish in its jaw. While catching the fish they maintain their place in advancing line. The smooth Indian Otter gives short yelping bark to communicate with fellow members. On an impending danger it whistles to alarm the other members. Breeding has not been studied.

Status: Threatened animal (IUCN Red List of threatened Animals, 1994).

Family: VIVERRIDAE

7. *Viverricula indica* (Desmarest)

Rasse or Small Indian Civet

1819. *Viverra indica* Desmarest, *Nouv. Diet. Nat. Hist.*, 7: 170 (Type locality: India)

Diagnostic Characters: There is no dorsal crest which distinguishes it from the Indian Civet. A Tawny grey or greyish-brown animal with typically civet-like built, lined and streaked on back and croup; spotted more or less in rows along the flanks, with usually cross bars on the neck.

Distribution: India: Throughout except Himalayas

World: West Asia, Pakistan, Nepal, Sri Lanka.

Remarks: Economically important for Civet, which is extracted from scent gland. Inhabit long grasses or shrubs in forests but mostly live near human settlements, finding refuge in holes under rocks or lies down in grass or under bushes, in drains and abandoned houses. Nocturnal. Food consists of rats, squirrel, small birds, lizzards, snakes etc. The animal also eats various kinds of fruits, roots and other vegetable matters. There is no marked breeding period. Youngones are seen alround the year. Litter consists of four to five youngones.

8. *Herpestes edwardsi* (Geoffroy)

Indian Grey Mongoose

1818. *Ichneumon edwasdsii* Geoffroy, *Deser. Egypt.*, 2: 139 (Type locality: Chennai, India.)

Diagnostic Characters: A tawny yellowish grey mongoose with no stripes on the sides and neck. The tail which is as long as its body is tipped with white or yellowish red.

Distribution: India: Throughout except Himalayas.

World: West Asia, Pakistan, Nepal, Sri Lanka.

Remarks: Usual habitat is open land, scrub jungles, cultivated fields, hedge-rows, thickets and groves of trees. The species takes shelter under rocks, bushes, holes in the ground and tree hollows. The species is both diurnal and nocturnal and the food consists of rats, mice, snakes, lizzards, frogs etc. Breeding has been recorded alround the year.

Family: HYAENIDAE

9. *Hyaena hyaena* (Linnaeus)

Striped Hyana

1758. *Canis hyaena* Linnaeus, *Syst. Nat. 10th. ed.*, 1: 40 (Type locality: Laristan, southern Iran.)

Diagnostic Characters: Dog-like; head and front part of body massive. Jaws strong, developed for crushing hard bones. Heavy dorsal crest of long hairs present. Transverse stripes on dirty white coat are prominent.

Distribution: India: Throughout.

World: Southern Russia, south-west Asia, Asia Minor, North Africa, Nepal (Terai), Pakistan.

Remarks: Prefers to live in open country where low hills and ravines offer convenient holes and caves for shelter. Being nocturnal, the hyaena comes out in pack of 2 to 6 individuals and tramps many a kilometer in quest of food. The food usually consists of left-overs, but when hungry the species can even deprive leopards of their food. The mating takes place in cold weather and youngones are born in hot season..

Family: FELIDAE

10. *Felis chaus* Guldenstaedt

Jungle cat

1776. *Felis chaus* Guldenstaedt, *Nov. Com. Acad. Petrop.*, 20: 483 (Type locality: Terek river, north of Caucasus).

Diagnostic Characters: Legs are long with comparatively shorter tail which make them distinct in appearance. The eyes are pale green, which gives a cruel expression. Body colour sand-yellowish grey. The wild cat walks gracefully like a leopard.

Distribution: India: Throughout.

World: Widely distributed from north Africa through south-east Asia, Indo-China, Sri Lanka, Myanmar.

Remarks: The jungle cat prefers grassland, shrub jungle, reed bank and marshes. The species is diurnal and more active in mornings and evenings. The food consists of small mammals, birds and poultry. It is generally believed that two litters are produced in a year.

Order: ARTIODACTYLA

Family: SUIDAE

11. *Sus scrofa* Linnaeus

Wild Boar

1758. *Sus scrofa* Linnaeus, *Syst. Nat. 10th. ed.*, 1: 49 (Type locality: Germany).

Diagonostic Characters: There is a full crest or mane of back bristles reaching from nape down the back. The tushes are well developed in the males and both the upper and lower tushes curve outward and project from the mouth.

Distribution: India: Throughout.

World: Widely distributed in Europe, Africa, middle east, Russia, whole of Asia and Asia Minor.

Remarks: The wild boar inhabits scanty bush jungle, some times forests. The species raids crop fields and is most destructive to crop. Being omnivorous, food comprises roots, tubers, offal and carrion, insects, snakes etc. Both diurnal as well as nocturnal. The wild boar is intelligent animal and shows great courage and determination at the time of danger. A highly prolific breeder and breeds in all seasons. The species ejaculate 200-250 ml. of semen in a single discharge.

Order: LAGOMORPHA

Family: LEPORIDAE

12. *Lepus nigricollis* Cuvier

Indian Hare or Black-naped Hare

1823. *Lepus nigricollis* Cuvier, *Dict. Sci. Nat.*, 26: 307 (Type locality: Chennai, India).

Diagonostic Characters: There is a dark brown or black patch on back of neck from ear to shoulder. Upper surface of tail black.

Distribution: India: Practically throughout.

World: Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, Sri Lanka and Combdodia.

Remarks: Large tracts of bush and jungle alternating with cultivated plains afford them ideal conditions to live. Many also live in neighbourhood of villages and cultivation. Youngs are born with open eyes and are able to walk within 12 hours after birth.

Order: RODENTIA

Family: SCIURIDAE

13. *Funambulus pennanti* Wroughton

Northern Palm Squirrel

1905. *Funambulus pennanti* Wroughton, *J. Bombay nat. Hist. Soc.* 16(3): 411. (Type locality: Surat, India).

Diagonostic Characters: There are five stripes on back, three median, pale; dorsal stripes flanked on each side with a supplimentary pale stripe. Tail bushy and of equal length to body.

Distribution: India: Throughout except southern peninsula.

World: Pakistan, Nepal & Bangla Desh.

Remarks: The species is most common and familiar of all wild animals of India and can be seen near human settlements in houses, gardens, groves, hedges and road side trees. Food consists of fruits, nuts, young shoots, buds, pods, insects, eggs of birds etc., and the species drink nectar from flowers. Female mates with more than one male. Gestation period is about 45 days and two to three youngones are produced in an untidy nest.

Family: MURIDAE

14. *Rattus rattus* (Linnaeus)

House Rat; Black Rat; Roof Rat; Ship Rat

1758. *Mus rattus* Linnaeus, *Syst. Nat. 10th. ed.*, 1: 61 (Type locality: Sweden).

Diagonostic Characters: The dorsal fur is black and the belly smoke-grey.

Distribution: India: Widely distributed throughout India.

World: Essentially an Indian species but has reached throughout the World through trading ships.

Remarks: There are 13 geographical races in India, two in Andaman and Nicobar Islands and three in Sri Lanka. The body colour varies from black to brownish grey and yellowish or reddish brown on dorsal side and belly from smoky-grey to dingy and to pure white in cold and temperate countries of Europe & in mediterranean countries respectively. Similary, a colour variation is also noticed among the Indian species.

15. *Mus musculus* Linnaeus

House Mouse

1758. *Mus musculus* Linnaeus, *Syst. Nat. 10th. ed.*, 1: 62 (Type locality: Sweden).

Diagonostic Characters: In general built and appearance, the house mouse is a miniature replica of the common house rat (*R.rattus*), measuring 5 to 8 cms. without tail which is of equal length. Body colour varies from dark to lighter brown on dorsal side and paler below.

Distribution: India: Throughout.

World: Throughout.

Remarks: Prefer to live in houses, gardens and fields near human settlements. The house mouse is prolific breeder and gives birth to 4-5 youngones after maturity at an early age of a month and starts breeding.

16. **Bandicota bengalensis** (Grey and Hardwicke)
Lesser Bandicoot Rat "Indian Mole Rat"

1833. *Arvicola bengalensis* Gray & Hardwicke, *Illus. Indian Zool.*, 2, pl. 21. (Type locality: Bengal India)

Diagnostic Charaters: The species has a robust form, rounded head and ears with short broad muzzle. The body coat colour is dark greyish-brown with underside paler.

Distribution: India: Throughout.

World: Throughout south-east Asia.

Remarks: Inhabit cultivated plains, gardens, pasture land; wastland and forests. The species presence is made known by a pile of fresh earth resembling a large mole hill from which its name "mole rat" has been derived. Youngones get sexual maturity at an early age of 90 days and can produce 10 to 12 youngs at a time.

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चमगादड़ और उसकी उपयोगिता

डा० यदुनाथ प्रसाद सिन्हा *

चमगादड़ बहुत ही लाभदायक स्तनपायी जानवर है जो गाँव, शहर, जंगल, गुफा, नदी इत्यादि हर जगह पाये जाते हैं। कोई भी व्यक्ति ठीक सूर्यास्त के समय किसी भी स्थान पर खड़ा हो जाये तो उसे एक न एक तरह का चमगादड़ थोड़ी ही देर में उड़ता हुआ अवश्य दिखाई देगा। चमगादड़ ही एक ऐसा स्तनपायी जानवर है जो वास्तव में आकाश में परों की सहायता से चलता है।

इसे अंग्रेजी में बैट के नाम से जाना जाता है। इसका पंख झिल्ली की तरह होता है जो बाँह की कलाई, लम्बी अंगुलियों, शरीर के बगल और पिछली टाँगों तक तथा टाँगों और पूँछ के बीच फैला होता है। इसके पैर कमजोर और सभी अंगुलियाँ वक्राकार नुकीले पंजों में समाप्त होती हैं। इसकी आँखें छोटी, बाह्य कान मध्यम श्रेणी से लेकर बड़े होते हैं। इसके वृषण (टेस्टिज) उदरिय (अबडोमिनल) होते हैं लेकिन प्रजनन काल में अस्थायी रूप से अंड कोष की थैली में उतर आते हैं।

चमगादड़ का क्रम विकास अतीत में पेड़ों पर पाये जाने वाले कीट-भक्षी स्तनपायी, जो गैलियोपिथेक्स से अनेक गुणों में मिलते-जुलते थे, से हुआ माना जाता है।

वर्गीकरण के अनुसार चमगादड़ (आर्डर कार्बोरोप्टेरा : क्लास मैमेलिया) को दो सब आर्डर : मेगाकारोप्टेरा (फल-भक्षी) और माइक्रोकारोप्टेरा (कीट-भक्षी) में बाँटा गया है। इनमें मेगाकारोप्टेरा को अधिक प्राचीन माना गया है। सारे संसार में करीब 1,000 तरह के चमगादड़ पाये जाते हैं। भारत में करीब 140 तथा अकेले बिहार में 30 तरह के चमगादड़ हैं।

चमगादड़ पेड़ों पर, उनके खोंडरों में, पत्तियों के गुच्छों के मध्य तथा तना और सूखे छाल के बीच वाले हिस्से; पुराने मकानों, मंदिरों तथा मस्जिदों के अंधकारमय भागों, उसके छिद्रों तथा दरारों इत्यादि में, मनुष्य के द्वारा बनाये गये पुलों के अन्दर की छत, दीवारों तथा छिद्रों इत्यादि में, सुरंगों, कुओं तथा पहाड़ों की गुफाओं के अंदर पाये जाते हैं।

चमगादड़ से लाभ तथा हानि दोनों ही होते हैं। भारत में फल-भक्षी चमगादड़ करीब 12 प्रकार के तथा शेष कीट-भक्षी हैं। फल-भक्षी चमगादड़ों में टैरापस_जाइगेन्टियस, साइनोप्टेरस स्पिंक्स, साइनोप्टेरस ब्रैकियोटिस, रोसेटस लेस्वेनाल्टी और इयोनिक्टेरिस स्पेलिया काफी संख्या में पाये जाते हैं तथा फलों की बरबादी में इनका काफी हाथ है। ये फल, फूल, मंजड़ा, मकरंद इत्यादि को खाते हैं तथा बीज और अपच्य पदार्थ को मुँह से उगल देते हैं। जो बीज जमीन पर गिरते हैं, पौधे के रूप में उग आते हैं। इस प्रकार देखा जाता है कि एक ओर फल-भक्षी चमगादड़ फलों को नष्ट करते हैं जिससे किसानों को आर्थिक हानि होती है तो दूसरी ओर फलों के परागण तथा बीजों के फैलाने का काम करते हैं। बड़े-बड़े फलों जैसे आम इत्यादि जिसे फल-भक्षी पक्षी को एक स्थान से दूसरे स्थान पर ले जाने में काफी कठिनाई होती है उन फलों के फैलाव का काम टैरापस जाइगेन्टियस करते हैं। फल-भक्षी चमगादड़ का सबसे बड़ा दुश्मन मनुष्य है जो इसके माँस का उपयोग दवा के रूप में या इसके पौष्टिक गुणों के कारण करते हैं। जो व्यक्ति माँस नहीं खाते हैं वे इसके मित्र होते हैं क्योंकि वे इसके रक्षक होते हैं। वैष्णव लोगों के कट्टरपंथी होने के कारण ये जीव संरक्षित हैं। इनकी मृत्यु ग्रीष्म ऋतु

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में लू की चपेट में आने के कारण और रात्रि में भोजन के लिये घूमते समय बिजली के तार से टकराने से होती है। इनकी मृत्यु बैक्टीरियल बीमारी (ट्यूबरकल बैसिलाई) के कारण भी होती है।

लेप्टोस्पाइरा स्कफनेरी जो साइनोप्टेरस स्पेसिज के मस्तिष्क में पाये जाते हैं, लेप्टोस्पाइरोसिस नामक बीमारी मनुष्य एवं उनके पालतू जानवरों में फैलाते हैं। इस बीमारी में बुखार, सरदर्द, बदन में जाड़ा लगना, कैं, मौसपेशियों में दर्द, गुर्दा-व्यथा, मस्तिष्क की नाड़ियों की सूजन, रक्त-वाहिनियों से रूधिर का स्राव इत्यादि आम लक्षण हैं। इस बीमारी से मनुष्य एवं उनके पशुओं की कभी-कभी मृत्यु तक हो जाती है।

माइकोटिक बीमारी हवा में उत्पन्न होने वाले स्पोर्स से फैलती है जो श्वसन क्रिया द्वारा हमारे शरीर में पहुँच जाती है। ऐसा कोई जरूरी नहीं है कि ये बीमारी चमगादड़ से ही फैलती हो, लेकिन ऐसा देखा गया है कि ये बीमारी उन लोगों में अधिक पायी जाती है जो चमगादड़ के द्वारा मल-मूत्र त्याग किये जाने वाले स्थानों के आस-पास रहते हैं।

कुछ वाइरस, जैसे कियासनुर जंगली वाइरस मनुष्य और बंदरों में बीमारी फैलाते हैं, जो बहुत ही घातक हैं। इस वाइरस का हाल ही में मनुष्यों और बंदरों में मृत्यु के कारण का पता कर्नाटक में लगाया गया है। ये वाइरस टिक्स के द्वारा संचालित किया जाता है तथा बन्दर और मनुष्य इसके आकस्मिक परिचारक (होस्ट) माने गये हैं।

पावरि और सिंग (1965, 1968) द्वारा भारत में इसके प्रतिरक्षी टेरोपस जाइगेन्टियस, साइनोप्टेरस स्फिंक्स और रोसेटस लेस्चनाल्टी में पाया गया था और प्रायोगिक रूप में रोसेटस लेस्चनाल्टी और साइनोप्टेरस स्फिंक्स को संक्रमित कराया गया था। ऐसा कराने से रोसेटस लेस्चनाल्टी पर तो बीमारी का कोई खास असर नहीं दिखाई पड़ा लेकिन अधिकांश साइनोप्टेरस स्फिंक्स मर गये।

भारत के संक्रमित क्षेत्र से 517 चमगादड़ (साइनोप्टेरस स्फिंक्स, रोसेटस लेस्चनाल्टी और राइनोलोफस राक्सी) का सर्वेक्षण करने पर पता चला कि अलग-अलग तरह के वाइरस चार राइनोलोफस राक्सी के प्लीहा (स्प्लिन) में थे।

राजा गोपालन और अन्य (1969) ने पुराने कुएँ में संक्रमित चमगादड़ को पाया, जिस पर अनेक संक्रमित टिक्स (आरनिथोडोरस स्पेसिज) थे। अतिरिक्त अनुसंधान से स्पष्ट पता चला है कि इस वाइरस के भरण-पोषण में चमगादड़ का संभवतः हाथ है।

भारत में प्रत्यक्ष रूप से अवैध परजीविता का विवरण चमगादड़ के पुच्छपाली (फुलूक) के साथ दूसरे स्तनपायी जानवर में पाया गया है। भालेराव (१९४९) ने प्रोस्थोडेनड्रीयम ओभिगैनेसम नामक फुलूक कुत्ते की आँत (इन्टेस्टाइन) में पाया जो भारत और मियानमार (बर्मा) के टडेरिडा प्लेवटा, राइनोपोमा माइक्रोफाइलम और स्कोटिक्स पैलिडस से फैला है। इस तरह फुलूक किसी न किसी तरह चमगादड़ से अन्य जानवरों में फैलता है।

इस तरह ट्राइपैनोसोमस की 19 स्पेसिज संसार के उष्ण प्रदेशीय तथा इसके समीपवर्ती प्रदेश के करीब 52 स्पेसिज में पाये जाते हैं जो मनुष्य और उनके पालतू जानवरों में रोग उत्पन्न करते हैं।

इसके अलावा कुछ वैज्ञानिकों ने फल-भक्षी चमगादड़ को फल द्वारा मनुष्य में बीमारी फैलाने की संभावना को भी बताया है।

अनगिनत वर्ग के इनसेक्ट्स और अरकनिडस को भारत में चमगादड़ के ऊपर वाह्य परजीवी के रूप में पाया

गया है। राजस्थान और गुजरात में चमगादड़ के अध्ययन के क्रम में खटमल, स्ट्रेबलड, निक्टेरेबिड, स्पीनटरनीसिड, मैक्रोनाइसिड, अर्गासिड और आइक्सोडिड नामक वाह्य परजीवी के रूप में पाया गया था जिसका अध्ययन अडवानी और बजीरानी ने (1981) में किया था। ये वाह्य परजीवी मनुष्य और उनके पालतू जानवरों में फैलते हैं और उन्हें काट कर या खून चूसकर परेशान करते हैं जिससे कि उन्हें बैचेनी की हालत में रहना पड़ता है।

रहमान और कालरा (1940) ने सन जोसे स्केल नामक इनसेक्ट (होमोप्टेरा) के निम्फ को टेरोपस जाइगोन्टियस से प्राप्त किया जो इस नुकसानदेह कीड़े को फलों, पेड़ों और सजावटी पौधों में फैला कर उन्हें नष्ट करने में मदद करता है।

चमगादड़ के द्वारा फैलायी गयी बीमारियों से बचने के लिये, चमगादड़ से भरी गुफा, पुराने मकान इत्यादि में जाने से बचना चाहिये और लोगों को इसकी चेतावनी देना भी आवश्यक है। फिर भी बच्चों और पालतू जानवरों को ऐसे स्थानों पर जाने से रोकना बहुत ही कठिन है। इसलिये इन्हें टीका लगाना बहुत ही जरूरी है। जो चमगादड़ रैबिज वाइरस से प्रभावित होते हैं वे अपने वासस्थान के नीचे जमीन पर गिर जाते हैं। इसलिये बच्चों को इन स्थानों से हटा देना चाहिये। लेकिन चमगादड़ के दूसरे उपयोगिता को ध्यान में रखते हुये इसको खत्म नहीं होने देना चाहिये। बल्कि वहाँ से हटकर रहना चाहिये। अनाधिकृत लोगों को उन गुफाओं में नहीं जाने देना चाहिये जिसमें बहुत अधिक संख्या में चमगादड़ रहते हैं। विश्व स्वास्थ्य संगठन संस्था (1966) ने चमगादड़ या उसके रैबिज पर काम करने वाले व्यक्तियों के लिये उपचार की रूपरेखा बनायी है और अरक्षितता के पहले प्रतिरक्षण के लिये सलाह दी है।

चमगादड़ दिन के समय अक्सर मकान, पुल इत्यादि के अंधकारयुक्त जगहों का उपयोग करता है। रात में वह अधिक खुली जगहों जैसे बरामदा, गैरेज इत्यादि में दस-बारह और कभी-कभी तो हजारों की संख्या में रहते हैं।

चूँकि ये चमगादड़ फसल, गल्ले इत्यादि को नुकसान करने वाले कीड़े, चूहे इत्यादि को नष्ट करते हैं, अतः इन्हें नष्ट करने की सलाह किसी भी हालत में नहीं दी जा सकती है। फिर भी जिस व्यक्ति के घर में ये होते हैं वे काफी परेशान और चिन्तित रहते हैं और उसे भगाने की चेष्टा में लगे रहते हैं। इसके मल-मूत्र की गंध, भोजन करते समय मल-मूत्र का त्याग लोगों को परेशानी में डाल देते हैं। कभी-कभी बच्चे और पालतू जानवरों को भी ये काट खाते हैं जिससे उनमें रैबिज या टिटनस होने का डर रहता है। ऐसे परिस्थिति में लोगों को कभी-कभी घर का त्याग करना पड़ता है।

कुछ धार्मिक लोग इसे लक्ष्मी-समान मानते हैं और इन परेशानियों के होते हुए भी इन्हें मारने नहीं देते। बिहार के पुराने पटना शहर में चमगादड़ों की भरमार है और इनके मल-मूत्र के स्थान पर पाये जाने वाले तिलचट्टे तथा अन्य कीड़े-मकोड़ों से लोग परेशान हैं लेकिन लोग उन्हें मारने देना या पकड़ने देना पसन्द नहीं करते हैं। यहाँ तक कि इनके मल-मूत्र इत्यादि से घर का अनाज, दुकान का सामान इत्यादि दूषित होता है लेकिन लोग इनका अनिष्ट नहीं चाहते हैं। यहाँ तक कि घर में रहने वाले चमगादड़, बिल्ली, सर्प इत्यादि परभक्षी को भी आकर्षित करते हैं जो लोगों के लिये नुकसानदेह है। हम लोगों को पटना सिटी के पुराने मकान की छत, जिसमें असंख्य टेफोजोअस मेलानोपोगन थे, में एक नाजा नाजा (कोबरा) का सामना करना पड़ा था, जिसके फुँफकार से भयभीत होकर उस दिन हम लोगों को वहाँ से हटना पड़ा।

कभी-कभी जिन गुफाओं, खान या सुरंगों में काफी चमगादड़ होते हैं उनमें प्रवेश करते समय

इनके उड़ने से लोग डर जाते हैं और भय से उत्तेजित होकर गिर जाते हैं और पत्थर इत्यादि से टकरा कर घायल हो जाते हैं या उनके शरीर में खरोंच लग जाती है।

चमगादड़ के मल-मूत्र के सड़ने से अमोनिया गैस काफी मात्रा में बनती है, जो खान या गुफा में जाने वाले लोगों के लिये खतरा उत्पन्न कर देती है। लेकिन कुछ चमगादड़ ऐसी परिस्थिति में भी रहने के अभ्यस्त हो जाते हैं और इन पर इस गैस का कोई असर नहीं पड़ता है।

जिस गुफा में वायु बाहर निकलने की कम जगह होती है उसमें कार्बनडाइऑक्साइड की मात्रा काफी बढ़ जाती है। ऐसी हालत में भी कुछ चमगादड़ रहते हुए पाये गये हैं लेकिन वहाँ पर मनुष्य 15 मिनट से अधिक रहना बर्दाश्त नहीं कर सकते हैं।

रात्रि के समय, हवाई जहाज को चमगादड़ से टकराने या इंजन में प्रवेश करने का डर रहता है जिससे हवाई जहाज को क्षति पहुँचने की संभावना रहती है। ये चमगादड़ 2000 फीट से कम ऊँचाई पर पाये जाते हैं जहाँ पर कीट-पतंगों से इनका सामना होता है। इनका हवाई जहाज के रडार-प्रणाली से रडार-प्रचालक को आसानी से पता चल जाता है और वे इसकी खबर पाइलट को देकर सावधान कर देते हैं।

यह प्रत्यक्ष है कि कीट-भक्षी चमगादड़, काफी अधिक संख्या में संधिपद प्राणियों (आर्थ्रोपोड) को नष्ट करते हैं फिर भी भोजन की मात्रा और प्रकार के ठीक-ठीक आँकड़े अभी तक प्राप्त नहीं हुए हैं। कुछ छोटे चमगादड़ जैसे पिपिस्ट्रेल, टेडारिडा इत्यादि के बारे में ऐसा अनुमान है कि ये काफी अधिक मात्रा में मच्छर खाना पसन्द करते हैं जिससे कि वे मलेरिया के नियंत्रण में सहायक सिद्ध होते हैं। इसी तरह शलभ, बीटिल इत्यादि जो फसल और लकड़ी को बहुत अधिक नुकसान पहुँचाते हैं, बहुत अधिक संख्या में कीट-भक्षी चमगादड़ द्वारा खाये जाते हैं। मेगाडरमा लाइरा और मेगाडरमा स्पाजमा चूहे, छछुन्दर, टिड्डी आदि को नियन्त्रित करने में बहुत अधिक मदद करते हैं। राइनोपोमा स्पेसिज दीमक के नियंत्रण में काफी सहायता करते हैं।

वैज्ञानिकों का विचार है कि चूंकि चमगादड़ आदमी के स्वास्थ्य और कल्याण के लिये काफी महत्वपूर्ण जीव हैं, इसलिये इसके वर्तमान उपनिवेश के संरक्षण, नये उपनिवेश की स्थापना तथा कुछ अवसरों पर चमगादड़ के बारे में अधिक जानकारी प्राप्त करने के लिये लोगों को उत्साहित करना चाहिये।

चमगादड़ के मल अथवा मल भरी मिट्टी का उपयोग संसार के सभी उष्ण प्रदेशों में शोरा (साल्टपीटर) के श्रोत के रूप में किया जाता है जिसका व्यवहार गन-पाउडर के बनाने में होता है। किसान भाई इसका उपयोग खाद (फरटिलाइजर) के रूप में अपने खेतों में करते हैं। राजस्थान में इसकी खाद को मिर्च और प्याज की खेती के लिये सर्वश्रेष्ठ माना जाता है।

चमगादड़ में प्रतिध्वनि द्वारा मार्ग खोजने के ज्ञान से ऐसा उपकरण तैयार करने में मदद मिल सकती है जिससे अंधे लोग आसानी से अपना रास्ता या अन्य वस्तुओं का पता लगा सकते हैं।

भारत में चमगादड़ के नियंत्रण के लिये धुएँ एवं घंटी इत्यादि से ऊँची आवाज का प्रयोग किया जाता है जिससे कुछ देर के लिये या कुछ दिनों के लिये यह जानवर उस स्थान से हट कर दूसरे स्थान पर चला जाता है, लेकिन फिर वापस आ जाता है। भारत में काँटेदार झाड़ी का भी प्रयोग चमगादड़ भगाने के काम में लाया जाता है। फल-भक्षी चमगादड़ से फलों को बचाने के लिये उसे घंटी, टीन इत्यादि बजा कर भगाया जाता है। हर पेड़ को फल लगने के समय जाल से ढक कर भी फलों को फल-भक्षी चमगादड़ से बचाया जा सकता है।

हिरणों का संसार

शिवप्रसाद, वैज्ञानिक - एस0डी0 *

सारांश

मृग एवं मृगया का इतिहास उतना ही प्राचीन है जितना कि सृष्टि की संरचना के बाद मानव के उद्भव का। फिर भी यह निश्चित रूप से नहीं कहा जा सकता है कि हिरणों की उत्पत्ति का श्रोत एवं क्रम आदि काल से कैसा रहा है तथा इनका सही-सही उत्पत्ति काल एवं उत्पत्ति का स्थान कहाँ है? इन्हीं सब बातों की विवेचना प्रस्तुत लेख में करने का प्रयास किया गया है। साथ ही जन-

साधारण से लेकर विषय-वस्तु विशेषज्ञों की जानकारी हेतु हिरणों का वर्गीकरण, प्राकृतिक वास, स्वभाव तथा प्रकृति में उनकी पहचान व स्थान इत्यादि के तथ्यों को सरल ढंग से लिखने का प्रयास किया गया है।

उत्पत्ति एवं विकास का इतिहास :-

प्राणी वैज्ञानिकों के मतानुसार हिरन पुरानी दुनिया में यूरोप तथा एशिया में उत्पन्न एवं विकसित हुए। किन्तु इनकी उपस्थिति अफ्रीका तथा दक्षिण सहारा में अज्ञात रही। साथ ही ये मरुभूमि (रेगिस्तान) जैसे एथोपियन रीजन में नहीं पाये जाते हैं। जहाँ तक ध्रुवीय बारासिंघा (रेंडियर) की मूल उत्पत्ति स्थान एवं काल का प्रश्न है, यह अभी भी अनुत्तरित है। सिकाइन तथा रूसाइन प्रकार के हिरन पुरातन युग (मियोसिन एज) के बताये जाते हैं। हिरन कदाचित् सर्वप्रथम जुगाली करने वाले चौपाये हैं, जो अति विकसित जुगाली करने वाले चौपायों एवं जुगाली न करने वाले चौपायों (कस्तूरी मृग) के बीच में एक कड़ी का कार्य करते हैं। इनमें दोनों ही प्रकार के चौपायों के कुछ-कुछ गुण विद्यमान हैं।

साधारण लोग अज्ञानतावश कृष्ण मृग (ऐन्टीलोप सरबी कापरा), चौसिंगा (टेटरा सिरास क्वाडीकारनिस) तथा चिंकारा (गज़ेला गज़ेला) जो कि मृग के समान ही दिखते हैं, को भी आदर्श हिरन समझ बैठते हैं। किन्तु ये पूर्णतया मृग कुल से भिन्न हैं। इनमें सबसे बड़ा अन्तर यह है कि इनके सींग खोखले तथा स्थिर (परमानेंट) होते हैं। दूसरा अन्तर यह है कि ऐन्टीलोप में जन्म के समय अथवा जीवन में कभी भी शरीर पर सफेद चकते (व्हाइट स्पॉट) नहीं होते हैं, जबकि मृग छौने प्रारम्भ में सदैव ही सफेद छींटे वाले होते हैं, जोकि सिवाय चीतल के अन्य सभी प्रजातियों में शीघ्र ही लुप्त हो जाते हैं।

वर्गीकरण (क्लासिफिकेशन)

साम्राज्य- (ऐनिमल किंगडम) -	ऐनिमेलिया (जन्तु)
संघ- (फाइलम) -	बरेटीब्रेटा (कशेरुक)
वर्ग- (क्लास) -	मैमेलिया (स्तनपायी)
गण- (आर्डर) -	बोबाइन
कुल- (फेमिली) -	सरबिडी
वंश- (जीनस) -	सरवस

हिरन (मृग) की परिभाषा — वैसे तो हिरनों को किसी विशिष्ट एवं ठोस अथवा अकाट्य एवं लिखित रूप से परिभाषित करना कठिन ही नहीं अपितु असम्भव भी है, क्योंकि इस परिवार में कोई भी एक ऐसा सामान्य परिभाषित मृग विद्यमान नहीं है जो एक आदर्श रूप हो तथा एक सर्वमान्य परिभाषा सब मृगों पर लागू हो। फिर भी एक ऐसा विशिष्ट एवं परिमार्जित आदर्श तथा पैदायशी गुण तो है ही जो चित्ताकर्षक भी है और सम्पूर्ण मृग कुल के नवजात छौनों, चाहे वह नर हो या मादा, में बिना नागा पाया जाता है और वह है शरीर पर सफेद छींटों का होना। ये सफेद छींटे चीतल में तो आजीवन बने रहते हैं किन्तु अन्य मृगों में वृद्धि के साथ-साथ धूमिल पड़ते जाते हैं तथा कभी-कभी ऋतु परिवर्तन के समय हल्के-हल्के उभर आते हैं। यदि हम अन्य गुणों की ओर अधिक ध्यान न दें तो हिरन या मृग की परिभाषा कुछ-कुछ इस प्रकार बनती है— “हिरन वे स्तनपायी जुगाली करने वाले चौपाये वन्य प्राणी हैं जो सफेद चित्तेदार मृग छौनों के रूप में जन्म लेते हैं।

हिरन कुल (फेमिली सरबिडी) के मुख्य लक्षण :-

1. सामान्यतया नर हिरनों के सिर पर ठोस तथा निष्पातनशील सींगों (ऐन्टलर) की उपस्थिति होती है, जो प्रारम्भ में खाल तथा रोमयुक्त होते हैं। चीनी जलमृग (चायना वाटर डियर) तथा कस्तूरी मृग इसके अपवाद हैं, जिनमें नर तथा मादा दोनों के सींग नहीं होते हैं। जबकि रेन्डियर के नर तथा मादा दोनों के सर पर अति विकसित सींग होते हैं। प्रत्येक मृग-नर सींगों (ऐन्टलर) को प्रतिवर्ष एक विशेष समय पर गिरा देता है।
2. प्रत्येक हिरन छौना अवस्था में चीतल की तरह चकत्तेदार होता है और सिवाय चीतल के लगभग सभी वंश की जातियों में प्रौढ़ अवस्था तक पहुँचते-पहुँचते ये सफेद चित्तियाँ नर व मादा दोनों में या तो पूर्ण रूप से लुप्त हो जाती हैं या किसी-किसी जाति में मौसम बदलने के साथ कभी-कभी धुंधले धब्बे प्रतीत होते हैं।
3. मुख गुहा के दोनों जबड़ों में उपस्थित दातों की संख्या का कुल योग ३२ होता है तथा ऊपर के जबड़े में सामने वाले दाँत जिनको काटने वाले/कुतरने/खाने वाले इनसाइजर/मोलर कहते हैं, का अभाव रहता है। इनकी जगह ठोस तालू (पैड) पाया जाता है। कस्तूरी मृग में चीर-फाड़ (कैनाइन) वाले दाँत ऊपरी जबड़े में अति विकसित होते हैं। नर में तो ये अत्यधिक विकसित होते हैं और बाहर निकले होते हैं।
4. सुगंधि ग्रन्थियाँ हमेशा उपस्थित रहती हैं तथा अधिकांश में शरीर के भिन्न-भिन्न भागों में बंटी रहती हैं। ये सुगंधि ग्रन्थियाँ शरीर में भिन्न-भिन्न कार्य सम्पादित करती हैं या करने में सहायक होती हैं। जैसे १. चेहरे की ग्रन्थियाँ ठीक आँखों के नीचे स्थित होती हैं २. कपाल ग्रन्थि वाकड़ में होती हैं ३. खुर ग्रन्थि (हूफ ग्लैन्ड्स) ४. पुच्छ ग्रन्थि ५. नाभि ग्रन्थि जो कस्तूरी मृग में पायी जाती है। कस्तूरी मृग के सिवाय सभी हिरनों के उदर, गले में पित्ताशय (गाल ब्लेडर) नहीं पाया जाता है।
5. मृग श्रृंगियाँ (ऐन्टलर) प्रारम्भ में खाल से ढके रहते हैं तथा रोमयुक्त (वलवेट) होती हैं। इनमें धमनियों-शिराओं द्वारा रक्त प्रवाह तब तक होता रहता है जब तक ये पूर्ण रूप से परिपक्व नहीं हो जाते हैं। परिपक्व होने पर निष्पातन से पूर्व रक्त प्रवाह वाहिनियों में सूख जाता है तथा मृग श्रृंग पेडिसिल से निष्पातित हो जाते हैं। पेडिसिल फिर से नये श्रृंगों को जन्म देने में सक्षम होते हैं।

भारत में पाये जाने वाले हिरन और प्रकृति में उनकी पहचान :-

१. चीतल— स्पाटेड डियर (ऐक्सिस ऐक्सिस एरिक्सिलवेन)

(क) स्थानीय नाम :- चीतल, चितरा झाँक, इत्यादि।

(ख) वितरण :- लगभग समस्त भारत के वनों में सिवाय राजपूताना व पंजाब के सूखे भागों के।

(ग) मुख्य लक्षण :- नर तथा मादा दोनों ही के शरीर के ऊपरी भाग में आजीवन सफेद चकत्ते होते हैं। नर के सर पर सींग (एन्टलर) केवल द्विशाखीय छत्र होते हैं। सींगों की लम्बाई ६० से०मी० होती है। शरीर की ऊँचाई अगले खुरों से कन्धे तक ६० से०मी० तथा शरीर का भार ८५ कि०ग्रा० तक होता है। भारतीय हिरणों में यह सबसे सुन्दर है।

(घ) प्रजनन काल :- विशेषतया जून-जुलाई साधारणतया पूरे वर्ष। गर्भावस्था ७-८ महीने। मृग छौने फरवरी-मार्च में पैदा होते हैं। सामान्यतया एक बार में एक छौना होता है, किन्तु विषम परिस्थितियों में कभी दो बच्चे भी पैदा होते देखे गये हैं। भारतीय जलवायु में परिपक्वता १ १/२ से २ १/२ वर्ष की आयु में पहुँचती है। चीतल की आयु १०-१२ वर्ष की आँकी गई है।

२. साँभर (सरबस यूनीकलर कैर०) :-

(क) स्थानीय नाम :- हिन्दी-साँभर, सामर, मराठी- साम्बर, तमिल- कड़मार्न, मलयालम- कुल्लेमार्न, कन्नड़-कुदाये, कदामा, वर्मी-सुतः।

(ख) सामान्य स्थिति :- जिन वनों में चीतल पाये जाते हैं उनमें साँभर भी मिलते हैं। इसके अतिरिक्त साँभर बाहरी हिमालय पर्वतों में ८००० फीट तक की ऊँचाई वाले क्षेत्रों में भी पाया जाता है। साँभर भारतीय मृगों में सबसे भारी शरीर वाला मृग है। इसका रंग दोनों ही लिंगों में समान रूप से भूरा या पीला-सलेटी होता है। मादा का रंग नर की अपेक्षा कुछ हल्का होता है। नर के सर पर सींग होते हैं जो चीतल की अपेक्षा अधिक लम्बे, मोटे तथा भारी होते हैं। सींगों की लम्बाई ६० से०मी० से १३० से०मी० तक होती है। शरीर की ऊँचाई अगले पैरों के खुरों से कन्धे तक १४०-१५० से०मी० तक तथा शरीर का वजन २२५ से ३२० कि०ग्रा० तक होता है। शेर के मुख्य आहार प्राणियों में से साँभर एक है।

साँभर का प्रजनन काल नवम्बर-दिसम्बर से लेकर मई-जून तक होता है। मादा सामान्यतया एक बच्चे को जन्म देती है। बच्चे का रंग मैले सफेद से लेकर फौन कलर तक होता है। उम्र के साथ धीरे-धीरे रंग भूरा अथवा पीला सलेटी हो जाता है। बच्चे २ से ३ वर्ष की आयु में वयस्क हो जाते हैं।

३. कश्मीरी वारासिंघा (सरवस इलेफस हेगलू-वेगनर) :-

अंग्रेजी में इसे कश्मीर स्टैग तथा कश्मीरी में हंगुल कहते हैं। यह केवल कश्मीर घाटी तथा कम संख्या में अगल-बगल की घाटियों में मिलता है। इसका रंग साँभर जैसा होता है, किन्तु आकार में साँभर से छोटा होता है। शृंग-छत्र में सींगों की संख्या सामान्यतः ५ होती है। विशेष परिस्थितियों में यह १६ तक पहुँच जाती है। हंगुल की ऊँचाई अगले खुर से कन्धे तक १२० से १२५ से०मी० तथा वजन १८० कि०ग्रा० तक होता है। इसका प्रजनन काल भी शीत ऋतु है। कश्मीर के सामाजिक एवं सांस्कृतिक जीवन में हंगुल एक लोकप्रिय मृग है। विगत में अन्धाधुन्ध शिकार के कारण यह मृग प्रजाति लुप्त होने की स्थिति में है।

४. मनीपुरी मृग (सरवस एलडाइ मैक क्लीलैन्ड) :-

इसे डान्सिंग डियर आफ मनीपुर भी कहते हैं। हिन्दी में यह मनीपुरी मृग, मनीपुरी संघाई, वर्मी में टामिन कहलाता है। यह केवल मनीपुर में करिबुल लॉमजावों राष्ट्र उद्यान में ही सीमित है।

नर मृगों का रंग गहरा भूरा (फ्यूमिंग, नाइट्रिक ऐसिड फ्यूमस्) व कभी-कभी कालेपन लिये हुए होता है। मादा का रंग हल्का भूरा होता है। मृग श्रृंग सामने से आगे की ओर घुमावदार अथवा अर्द्ध वक्राकार होते हैं। श्रृंगों की शाखायें ७ से १२ तक होती हैं और प्रायः कम नुकीली होती हैं। श्रृंगों की नाप ६० से ११३ से०मी० होती है। नर अगस्त में सींग गिराते हैं, शरीर की ऊँचाई १२० से०मी० तथा भार १८० कि०ग्रा० तक होता है। घास की तलाश में ये मृग एक झील से दूसरी झील के टापुओं में नाचते फिरते रहते हैं। इसीलिये इनको डान्सिंग मृग भी कहा जाता है।

प्रजनन काल मार्च अप्रैल तथा मृग छौने अक्टूबर नवम्बर में होते हैं। शेष सभी बातें अन्य मृगों की तरह ही हैं। यह मृग लुप्त होने की दशा में हैं (अति विरल)।

५. दलदली बारासिंघा (सरवस- ड्यूवेसेली, क्यूवीयर) स्वाप्प डियर।

(क) हिन्दी- बारासिंघा माहा; नेपाल, तराई, गोन्डा-गोनर, घोस; सेन्ट्रल इंडिया, -गोयनजेक (नर), गावोनी (मादा), साल, सामर, नरवारी।

(ख) केवल भारत में ही सीमित है तथा भारत के दलदली व तराई भाग के वनों में, वेन्डरी उपजाति केवल मध्यप्रदेश में ही सीमित है।

(ग) बालों का रंग सांभर जैसा ही होता है तथा ऊन की तरह मुलायम बाल व छाती पर बालों का गुच्छा, मृग छौने (फान्स) हल्के सफेद छीटों के साथ पैदा होते हैं जो धीरे-धीरे धूमिल पड़ते जाते हैं। मृग श्रृंगियाँ १०-२० शाखीय, मुख्य श्रृंग (वीम) आगे की ओर वलयाकार (अर्ध चन्द्राकार) झुकी हुई, श्रृंगों की वाह्य नाप ७५ से०मी० से १०४ से०मी० तक तथा मोटाई १३ से०मी० तक, शरीर की ऊँचाई १३५ से०मी० तक, वजन १७०-२०० कि०ग्रा० तक होता है।

(घ) साँभर की ही तरह।

(ङ) अति-विरल स्थिति (वेरी-रेयर स्टेज)।

६. सूकर मृग (हाँग डियर) ऐक्सिस पोरसिनस जिम्मरमैन

(क) हिन्दी- सूकर मृग, सिन्धी तथा पंजाबी- पारा, वर्मी-डेए

(ख) उत्तरी भारत, पंजाब से आसाम तक

(ग) भूरा या गहरा भूरा तथा कालापन लिये हुए, और बाल सूअर जैसे मोटे तथा खड़े प्रकार के। यह सूअर की तरह गर्दन झुकाकर चलता है मृग श्रृंगों की नाप ३०-६० से०मी० तथा सीधे उगते हैं। सीध शिखर पर शाखीय होती है। भार-चीतल से काफी कम तथा ऊँचाई ६१ से०मी० तक।

७. काकड़ (मन्टीयेकस मुन्टजैक जिम्मर मैन) बारकिंग डियर या मुन्टजैक।

(क) हिन्दी- काकड़, मराठी- मेकाड, तमिल- कार्टआरदू, वर्मी- जी, इंगलिश- बारकिंग डीयर

(ख) उत्तरी भारत, दक्षिण भारत, मालावार द्वीप, तथा हिमाचल प्रदेश के जंगलों में १५००—२४५० मीटर की ऊँचाई तक पाया जाता है।

(ग) बालों का रंग चेस्टनट जैसा भूरा व चमकीला तथा चटक लाल, कुत्ते जैसे भौंकने की आवाज, मृग श्रृंग, कपाल से नीचे (चेहरे के ऊपर) के हिस्से में उभरे हुए तथा घाटी बनाते हुए तथा श्रृंग आधार (पेडी सिल) बालों से ढके हुए होते हैं। श्रृंगों की नाप ५—१८ से०मी० तथा केवल द्विशाखीय, शरीर की ऊँचाई ५०—७५ से०मी० व भार २०—२३ कि०ग्रा० तक।

(घ) मुख्यतया शीतकाल (नवम्बर—दिसम्बर) वैसे वर्ष में कभी भी, अन्य गुण चीतल जैसे ही। स्थिति—विरल (रेयर)।

८. कस्तूरी मृग (मुश्क डियर) मोसंचस मोसचिफेरस, लिन०

(क) हिन्दी—कस्तूरा, मुश्क।

(ख) कश्मीर, नेपाल, सिक्किम, हिमाचल प्रदेश, उत्तराखण्ड के पर्वतीय अंचलों में।

(ग) शरीर अति अविकसित, नर, मादा दोनों ही श्रृंग विहीन, रंग— गहरा भूरा, तथा पुठों के पिछले भाग पर हल्के सफेद रंग के चकत्ते लिये हुए। कमर कुछ धनुषाकार झुकी हुई, (डोम शेड), तथा पिछली टांगें आगे की ओर कुछ अधिक मुड़ी हुई। नर मृग के ऊपरी जबड़े में चीर—फाड़ वाले दाँत (कैनाइन टीथ)

अधिक विकसित तथा मुख से सदा बाहर निकले हुए तथा नीचे की ओर मुड़े हुए। केवल नर मृग में कस्तूरी ग्रन्थि नाभि पर स्थित, जो अति तीव्र गन्ध वाली तथा सूखने पर अति सुगंधित गंध फैलाती है। खुरों के अग्र भाग भी अत्यधिक उन्नत व नुकीले होते हैं।

शरीर की ऊँचाई ५० से०मी० तक तथा भार चीतल से अत्यधिक कम मात्र २०—२५ कि०ग्रा०। चेहरे की ग्रन्थियाँ (फेथियल ग्लैंड्स) अनुपस्थित, जबकि सभी हिरनों में उपस्थित होती हैं। दुम गुच्छे के रूप में होती है। उदर गुहा के अन्दर पित्ताशय (गाल ब्लेडर) होता है जो कि अन्य किसी भी हिरन जाति में नहीं पाया जाता।

(घ) शीतकाल में (अक्टूबर—नवम्बर) विशेष या वर्ष के किन्हीं भी महीनों में। अन्य गुण चीतल जैसे ही, स्थिति अति—विरल (वेरी—रेयर)।

संरक्षण के उपाय

१. विरल एवं अति—विरल हिरनों की जातियाँ जो कि विघटन के कगार पर खड़ी हैं, उनके शिकार पर कड़ी रोक लगाई जाये।

२. अवैध शिकारियों के ऊपर अत्यधिक आर्थिक दण्ड एवं कारावास की सजा साथ—साथ दी जाये।

३. इन जातियों का वैज्ञानिक सुविधाओं के साथ प्रजनन एवं उनको उनके प्राकृतिक आवासों में पुनः स्थापित करना।

४. इनके प्राकृतिक हैवीतात का संरक्षण एवं अन्य और प्राकृतिक हैवीतातों की स्थापना।

५. देशवासियों में प्राकृतिक सम्पदा एवं वन्य जन्तुओं के प्रति शिक्षा, उनकी उपयोगिता तथा संरक्षण के बारे में जागरूकता पैदा करने का अभियान, स्कूलों से लेकर राष्ट्रीय स्तर तक जागृति पैदा करना। इत्यादि, इत्यादि।

KNOW YOUR WILDLIFE:

1. Cheetal (Axis axis):-

Cheetal is the most beautiful of the Indian deer. It is found only in India and Sri Lanka. In India it is widely distributed, wherever, the terrain is suited to its habitat. It prefers more open type of forest with good grazing and running streams. It is because these conditions prevail in many parts of the Sub-Himalayan tract, which is why it is more prolific there than in other parts of the country. Being gregarious Cheetal is ordinarily found in herds, small parties of seven or eight being usual. In the Naini Tal Terai and in Bhabar zone of Garhwal, ie; Lansdowne and Bijnor forest divisions, large herds numbering several hundred have been seen in the month of June, making a spectacular sight, specially when crossing some wide-open space. Early in the morning they can be found feeding in the open glades, but soon retire to rest in more shady and sheltered spots. It is less nocturnal than the Sambar.

Cheetal is a middle sized deer. A big stag weighs from 80-100 kilograms. Height at shoulder is about one meter. It has a long head, elongated limbs and a beautifully built body. The antlers are long and slender. The ears are rather narrow and the tail comparatively long and pointed. Body is spotted white on rich brown coat. Underbelly and legs are white. Cheetal stag with well developed antlers looks majestically beautiful. In the past Cheetal stags were shot for its head which make attractive trophies. The best heads are found in Uttar Pradesh. The average size of antlers is 28" and the record size is 39.7", though 36" long antlers are considered a good size. The handsome spotted skin makes excellent mats and rugs.

Cheetal is fond of company and is often found with village cattle grazing in the forest. When various forest trees are fruiting they will be found eating fruits and leaves dropped by monkeys and langoors. They may be said to be commensal with monkeys and langoors, who not only feed the cheetals but, as watchful sentry, also warn them against the prowling panther, by way of giving alarm call. Both tiger and panther prey on cheetal which is the major player in the biological food chain.

A dominant cheetal stag maintains a harem of 6-8 does. The younger males are kept at bay. Sometimes, specially during mating season, there is a fierce fight between two dominant males for establishing their supremacy over the harem. Mating generally takes place during June-July. Fawning takes place during February-March. Normally cheetal doe gives birth to one fawn and very rarely to two. Cheetal can easily be domesticated and feels at home with sheep, goats and cattle.

Cheetal are passionately social animals. They help each other, when in distress. They have been seen pushing forward a grievously injured fellow being and goad it to flee with them. But if they feel it will not be able to cope with them, they simply leave him and run away. This they decide in split second. The world of wide animals is really wonderful.

2. Sambar (Cervus unicolor)

SAMBAR is the largest of Indian deer. It is found in almost all parts of India ranging from the outer spurs of the Himalayas upto 3000 meters down to lower elevations of Nilgiris in South India. It



Cheetal (*Axis axis*) Photo : Shiv Prasad



Sambar (*Cervus unicolor*) Photo : M. Krishnan

inhabits densely forested areas and prefers dry undulating country. It is fond of rolling in muddy ponds and has been seen lying on thick sheet of snow even during winters. Sambar is moderately gregarious animal, the parties rarely approaching a dozen individuals. It is a grazing animal and is fond of fruits and bark of various forest tree and bushes. It is a pugnacious animal and if pushed to wall it has been known to kill beaters. Sambar is nocturnal in habit. It is one of the main prey animals of tiger.

Sambar is hefty and well built animal. A fully grown stag weighs upto 315 kgs. The length of the animal is about 3 meters and height at shoulders 1.5 meters. Tail is about 30 cm. and ears 18-20 cm. Colour is dark brown. The male has magnificent horns with basal antlers coming out directly from the base and pointing upwards and outwards. The length of horns is about 1 meter, the record horns of 50½" were obtained in Bhopal, north of the Narmada river. The horns are dropped in April and the new horns are not perfect till the end of September.

The breeding season begins at different times in different parts of the country. But generally the mating takes place in November-December. The stag's harem is limited to few hinds. The stags are known to possess a well defined territory during the breeding season. A single one is born at a birth. After the rut the stag deserts the hinds and young ones and lives a solitary life till the return of next mating season. The young ones are born in late May or early June.

It is interesting to note that the sambar found in Himalayan forests, at altitudes of 6000-7000 feet is much larger in size than its counterpart in plains forests. In hills of Uttar Pradesh it is called 'jarau' and is a massive animal. It is dark-grey in colour as compared to the sambar found in plains, which is ashy grey or buff in shade. This difference is probably due to climate and abundance of rich and nutritious grass. A 'jarau' seen at close quarters in thick oak forest is, sometimes, an awesomely sight.

Compiled by:- I.S. Negi

NEWS & VIEWS

NEWS

OFFICIALS SUCCEED IN TRAPPING KILLER LEOPARD IN UTTAR PRADESH HILLS

EXPRESS NEWS SERVICE

NEW DELHI, SEPT. 10, 1997

FOR about a month, Lansdowne-the picturesque town in Garhwal hills-remained under the spell of this fearless leopard. It attacked and injured three persons, including an Army jawan and an eight-year-old boy.

But the terror of feline did not last for long. In an unexpected development, the leopard was caught early this week by the forest department.

According to reports reaching here, the Officials has set up two iron traps even though they weren't sure that the method would work.

The man-eating leopards of Garhwal have lost all fear of humans and have turned into perfect killing machines in the past few years. They have even learnt to evade "arrest" through such machinations.

The leopard who fell into the trap is indeed the man-eater, says Naveen Raheja, member Tiger Crisis Cell of the Ministry of Environment.

"There is an injury on the leopard's forepaw which is why it has been limping. It took to attacking humans as it could pursue its normal prey," explained Raheja.

CONSERVATION LEADS TO RISE IN NUMBERS, UPSETS FOOD CHAIN IN GUJARAT.

Short of prey, leopards target humans

NEWS EXPRESS

DHARMENDRASINH CHAVDA

AHMEDABAD, SEPT. 18, 1997

Although wildlife conservation efforts have paid off in the State and the population of protected species like the leopard has increased, the Forest Department now faces a peculiar situation: Imbalance in the herbivore-carnivore ratio and the consequent increase in leopard attacks on humans.

The population of leopard has risen ever since conservation efforts began in the State. According to the census figures, their number has increased from 793 in 1993 to 810 this year. The villagers of Baria and Limkheda talukas of Panchmahals district and Chhotaudaipur taluka of Vadodara district have been plagued by an increase in leopard attacks.

According to a highly placed source in the Forest Department, at least 130 people have been injured in leopard attacks in the past four years and about 15 (mostly children) have lost their lives. The number of cattle including buffaloes and goats killed by the cats is still higher, the source pointed out.

Only last month, two leopards captured from these areas were handed over to the city zoo after they had attacked at least three persons, killing one in the process. The authorities have expressed concern over the fact that most of the victims are children.

Increase in attacks

Year	Incidents	Injuries	Deaths
1993-'94	26	26	0
1994-'95	30	25	5
1995-'96	38	34	4
1996-'97	50	46	6
TOTAL	144	131	15

Asked what draws the leopards to humans, Forest Department sources said: "This is due to an imbalance in the population of leopards and its prey. While the population of leopards has risen, the animals on which it preys have dwindled in numbers over the years." This is despite the fact that the leopard population has risen only marginally in Vadodara district-from 115 in 1993 to about 130 this year.

The Forest Department is planning a series of control measures. "To begin with, we are planning to go in for captive breeding of the spotted deer and langur in these areas. These animals will then be released in the wilderness as prey for the leopards," said Conservator of Forest (Vadodara) C.N. Pandey. Captive breeding of rabbit and hare has already begun, he added.

Pointing out that another reason why leopard move to the fringes of the forests is the shortage of water, especially during the summer months, Pandey said: "We have started making artificial water ponds and *talavadis* in the interior forest areas."

The department has also under-taken an awareness campaign to minimise encounters with leopards. "We are educating people not to isolate children and to patrol the village during nights," Pandey said.

Conservationist Lavkumar Khachar said: "The reason for the rise in leopard attacks is due to increasing human pressure on the forest areas," he claimed, adding that unless strict measures were enforced to reduce human encroachment, such preventive action would be of little use.

ELPHANTS BEING KILLED FOR MEAT

EXPRESS NEWS SERVICE

TILAK RAI

SHILLONG, MAY 1, 1997.

Wildlife officials have long fought a losing battle to control poaching of elephants for ivory. Now, their counterparts in Meghalaya have an added problem. The animal here is being poached for its meat. Recently, the police arrested two people from Shillong with 14 sacks of smoked elephants.

The "delicacy", according to officials, would have found many buyers in the city. Elephant meat is in great demand in the North-east. And John Vaiphei and Simpoo V. Vaiphei, the two arrested, may not be the only dealers in the trade.

According to official records, 13 elephants have been killed in the Garo Hills district in the past two years. During a recent meeting, Chief Wildlife Warden S.B.Singh observed they may have been targeted for their meat. The conservator of the Wildlife Protection Wing, Sunil Kumar, also admitted that poaching of elephants for meat was on the rise in the state.

To add to the Wildlife Protection Wing's woes, poaching has lately become more organised. Villagers living around the reserve reportedly actively aid in the killing of elephants and other animals.

The dealers are believed to be people from neighbouring states. Once an elephant is killed, its meat is smoked and then taken to Shilong and from there on to Mizoram and Nagaland.

But, more than the involvement of villagers, what worries the wildlife officials is the connivance of lower functionaries of the state police. In at least three cases of poaching, constables of the Meghalaya Police have been found to be involved. However, the Police Department has refused to initiate action against those concerned.

Besides being short-staffed, forest officials are also hampered by outdated weapons. While most have double-barrel guns, the poachers are armed with sophisticated weapons.

A part of the blame, however, may lie with the Wildlife Department. According to a CAG report, the department has still not utilised the Central assistance of Rs.4.20 lakh provided to it in 1990-91 for maintaining a poaching squad.

Compiled by I.S.Negi.

GREEN BELT UTKAL AGE EDITION OF ASIAN AGE

Shrinking Satkosia Cover raises alarm

BY JAGADANANDA PRADHAN

Angul, Sept. 26 1997: Forest cover in the Satkosia belt, which covers an area of 795 square kilometers and houses the famous Satkosia gorge sanctuary in Angul district, is fast getting depleted.

This is happening due to indiscriminate felling of trees, as well as large-scale poaching that is carried on here. The sanctuary has 38 species of mammals, 128 species of birds, 21 species of reptiles, four species of amphibians and 183 types of fish. It is home to elephants and turtles, besides many endangered species of animals, including tigers, nilgai, chaurisingha, sambar and sloth bear.

To conserve and breed crocodiles and alligators, a research and conservation unit had been set up at Tikarpara in the forest belt, which has emerged as a tourist spot. About 400 species of plants are found in this forest. Environmentalists and nature lovers of the state are concerned about the deteriorating condition of this gift to nature. They have often demanded that it should be brought under a single administration and developed into an elephant sanctuary. An order passed in 1990 to establish a wildlife divisional office at Angul was rescinded in 1994. Following that the territorial powers were transferred to the district forest officers of Anugl, Athagarh, Athmallick, Nayagarh and Boudh. Flow of funds from the Union government and international institutions have also stopped of late. Unless remedial measures are taken immediately, the state will lose this forest wealth.

BETER LATE THAN NEVER

UTAL AGE EDITION OF ASIAN AGE

Gahirmatha beach declared marine turtle sanctuary

BY ARABINDA MISHRA

Bhubaneswar, Oct.1, 1997: The Orissa government has declared the Gahirmatha Beach under the Bhitarkanika Wildlife Sanctuary in Kendrapara district, as a marine turtle sanctuary. The Gahirmatha Beach, the preferred nesting place of Olive Ridley turtles, became the first marine turtle sanctuary in the country.

This was revealed by chief wildlife warden S.K. Patnaik. He said that the government of India took a long time to declare this "unique" place as a marine turtle sanctuary. The incidents of mass killing of the rare Olive Ridley turtles at Gahirmatha Beach could now be checked by implementing laws meant for marine sanctuaries. Persons found guilty of illegally fishing in the prohibited areas near Gahirmatha Beach will also be booked under the laws, he said.

Admitting that very few turtles turned up to lay eggs at the beach last year, Mr. Patnaik said mass killing of their species at the beach may not be the only reason why the turtles selected another place for their annual nesting. He said noise and other activities at the beach may have disturbed them.

Meanwhile, participants at a meeting held here on Monday expressed concern over the situation. The director general of Coast Guards, Vice-admiral R.N. Ganesh, who presided over a seminar on "Protection of Sea Turtles," said he is convinced that movement of trawlers and spread of gill netting in their way are the main reasons why the turtles are killed. The use of turtle excluder device could help bring down the turtle mortality rate, he said, adding that he has watched on Internet how turtles are killed as they come in contact with trawlers.

Mr. Ganesh said coast guards will now keep constant vigil over the movement of trawlers in the prohibited areas of the marine sanctuary. He added that the coast guards will rather concentrate on the sanctuary area instead of guarding the entire coast. He asked the chief wildlife warden of the state to provide maps and other logistic support to the coast guards.

Mr. Chitta Behera of Project Swaraj, a Cuttack based NGO, and other experts at the seminar observed that movement of trawlers is the main reason for high turtle mortality rate. This was, however, defied by President of the marine producers association. The meeting resolved that the turtle excluder device is the only alternative to save turtles.

Courtesy Sumitra Rath, Cuttack, Orissa.

To add to the Wildlife Protection Wing, Odisha, the Government has decided to declare the Gammam Beach as a marine turtle sanctuary. The Gammam Beach, the preferred nesting place of Olive Ridley turtles, became the first marine turtle sanctuary in the country. This was revealed by chief wildlife warden S.K. Patra. He said that the government of India took a long time to declare this 'unique' place as a marine turtle sanctuary. The incident of mass killing of the rare Olive Ridley turtles at Gammam Beach could now be checked by implementing laws meant for marine sanctuaries. Persons found guilty of illegally fishing in the prohibited area near Gammam Beach will also be booked under the law, he said. Admitting that very few turtles turned up to lay eggs at the beach last year, Mr. Patra said mass killing of these species at the beach may not be the only reason why the turtles selected another place for their annual nesting. He said noise and other activities at the beach may have disturbed them.

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Wildlife Preservation Society of India

1. The aims and objects of the Society are as follows:-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with other Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts, Wild Birds and animals Protection Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of India in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
- (f) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, filmstrips and other feasible methods.
- (g) To assist members of the Society in obtaining facilities for viewing and photographing wildlife in India.
- (h) To conduct research into the problems of Wildlife management in India and in pursuance of this to initiate, encourage and where possible assist in the projects for the study of threatened species and related objects and to provide reference and research facilities for such work.
- (i) To carry on such other activities which will serve the above subjects.

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